ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

BIOLOGICAL OPINION

Action Agency: National Marine Fisheries Service, Northeast Region Sustainable Fisheries Division

Activity: Authorization of fisheries under the Spiny Dogfish Fishery Management Plan [Consultation No. F/NER/2001/00544]

Consulting Agency: National Marine Fisheries Service, Northeast Region Protected Resources Division

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Abstract. To comply with the requirements of the Endangered Species Act of 1973, the National Marine Fisheries Service (NMFS) has prepared a biological opinion on its proposal to continue prosecuting various fisheries that are managed under the Spiny Dogfish Fishery Management Plan, Northeast Atlantic Ocean. The biological opinion considers the effects of sink gillnet, bottom otter trawl, bottom longline, and drift gill net associated with fisheries targeting spiny dogfish on threatened and endangered species and critical habitat.

The fisheries being considered in this Opinion are subject to regulations established by the Atlantic Large Whale Take Reduction Plan, as amended (ALWTRP). This Opinion treats different actions taken to implement the ALWTRP differently because some aspects of the ALWTRP have been implemented for several years, some have been implemented recently, and some have not yet been implemented. Continuing aspects of the ALWTRP that were implemented in 1997 – such as the sighting advisory system, whale disentanglement network, and gear research and development – are addressed in the *Environmental Baseline* of this Opinion. Aspects of the ALWTRP that became effective in February 2001 – such as new gear requirements for sink gillnet fisheries and new closures – are addressed in the *Description of the Proposed Action* section of this Opinion.

Based on previous patterns of interactions between the fisheries and endangered species, the Opinion concludes that the proposed fisheries are not likely to adversely affect the hawksbill turtle, *Eretmochelys imbricata*; shortnose sturgeon, *Acipenser brevironstrum*; or the Gulf of Maine DPS of Atlantic salmon, *Salmo salar* and critical habitat designated for the right whale.

Based on previous patterns of interactions between the fisheries and threatened and endangered sea turtles and marine mammals, the Opinion concludes that the proposed fisheries are likely to adversely affect right whale, *Eubalena glacialis*; humpback whale, *Megaptera novaeangliae*; fin whale, *Balaenoptera physalus*; blue whale, *Balaenoptera musculus*; sei whale, *Balaenoptera borealis*; sperm whale, *Physeter macrocephalus*; green turtle, *Chelonia mydas*; leatherback turtle, *Dermochelys coriacea*; loggerhead turtle, *Caretta caretta;* Kemp's ridley turtle, *Lepidochelys kempii,* and hawksbill sea turtle (*Eretmochelys imbricata*) . NMFS has based this conclusion on previous patterns of marine mammals and turtles that have been captured, injured, or killed through interactions with the gear used in the fisheries.

The analysis of the effects of the proposed action involved a review of records of entanglements of whales and the interactions of sea turtles and fishing gear and the rate of mortality and serious injury resulting from the gear interactions.   Based on the analysis, NMFS concluded that the numbers of western North Atlantic right whales captured, injured, or killed in the fisheries managed under the FMP would reduce the numbers and reproduction of this species in a way that would be expected to appreciably reduce their likelihood of surviving and recovering in the wild. NMFS concluded that the numbers of humpback, sei, fin, blue, and sperm whales; and loggerhead, leatherback, Kemp's ridley, and green turtles captured, injured, or killed in the proposed fisheries would not reduce the numbers and reproduction of that species in a way that reduced it likelihood of surviving and recovering in the wild. The Opinion outlines a Reasonable and Prudent Alternative (RPA) that is expected to avoid the likelihood of jeopardizing right whales. The RPA includes components that minimize the overlap of right whales and Spiny Dogfish gillnet gear, expand gear modifications to the mid-Atlantic and southeastern U.S. waters, continue gear research, and monitor the implementation and effectiveness of the RPA. The Opinion also provides an Incidental Take Statement that includes measures to minimize the impact of captures and deaths of sea turtles and Conservation Recommendations to avoid and minimize adverse effects to sea turtles and listed whales.

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Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. § 1531 et seq.) requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect species listed as threatened or endangered, that agency is required to consult with either the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service, depending upon the species that may be affected. In instances where NMFS or FWS are themselves proposing an action that may affect listed species, the agency must conduct intra-service consultation. Since the actions described in this document are authorized by NMFS' Northeast Region Sustainable Fisheries Division, this office has requested formal intra-service section 7 consultation with NMFS' Northeast Office of Protected Resources.
This document represents National Marine Fisheries Service's biological opinion (Opinion) on the continued authorization of fisheries managed by the Spiny Dogfish Fishery Management Plan (FMP) in northeastern Atlantic waters, and it's effects on western north Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), blue whale (*Balaenoptera musculus*), sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*), loggerhead sea turtle (*Caretta caretta*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and green sea turtle (*Chelonia mydas*), in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA). This Opinion summarizes results of NMFS' evaluation of new information on the biological status of the endangered right whale, recent entanglements of listed species, and revisions to the Atlantic Large Whale Take Reduction Plan (ALWTRP) which have been incorporated into NMFS' management of the Spiny Dogfish fishery.

The ALWTRP is a plan developed under the authority of the Marine Mammal Protection Act (MMPA) to reduce serious injury and mortality to right whales, amongst others, in four east coast fisheries including the spiny dogfish gillnet fishery. The ALWTRP measures were published on July 22, 1997 in interim form and in a final rule on February 16, 1999. Since NMFS had identified implementation of the ALWTRP as a reasonable and prudent alternative to avoid the likelihood of jeopardy to right whales for gillnet fisheries managed under the Multi-species FMP (which included the Spiny Dogfish fisheries) in it's December 13, 1997, Opinion, compliance with the Plan was incorporated into NMFS' proposed management of the Spiny Dogfish FMP. As a result, NMFS's August 13, 1999, Opinion, which focused only on the Spiny Dogfish FMP concluded that prosecution of these fisheries, as modified by the ALWTRP, was not likely to jeopardize right whales. However, despite implementation of these measures, serious injuries and at least one mortality of a right whale have occurred as a result of entanglements in gillnet gear. The gillnet gear entanglements may or may not be attributable to the spiny dogfish gillnet fishery. In most cases, NMFS is unable to assign responsibility for a gillnet gear entanglement to a particular fishery since entangling gear is not often retrieved or, when retrieved, lacks adequate identifiers to determine the fishery from which it originated.

Since the NMFS has been unable to determine the origin of the gillnet gear involved in the whale entanglements, including the gear involved in the 1999 right whale mortality, NMFS cannot assume that these entanglements were not the result of the spiny dogfish gillnet fishery. As a result, NMFS is reinitiating the Section 7 consultation of the Spiny Dogfish FMP in order to both reevaluate the potential impact of the spiny dogfish fishery on right whales, and the effectiveness of the ALWTRP to avoid the likelihood of jeopardy to the right whale population. NMFS will also consider in this Opinion new information on the status of the northern right whale and newly revised ALWTRP measures which affect operation of the spiny dogfish gillnet fishery.

Formal intra-service section 7 consultation on NMFS' continued authorization of fisheries under the Spiny Dogfish FMP was reinitiated on May 4, 2000. This Opinion is based on information developed by the Mid Atlantic Fishery Management Council (MAFMC) and the New England Fishery Management Council (NEFMC)(1999a) which contains the Spiny Dogfish FMP, and other sources of information. A complete administrative record of this consultation is on file at the NMFS Northeast Regional Office, Office of Protected Resources, Gloucester, Massachusetts [Consultation No. F/NER/2001/00544].

I. CONSULTATION HISTORY

The Spiny Dogfish FMP was developed jointly by the Mid Atlantic Fishery Management Council (MAFMC) and the New England Fishery Management Council (NEFMC) to eliminate overfishing and rebuild the stock of spiny dogfish (*Squalus acanthias*), hereafter referred to as "dogfish" to an optimum yield level. Prior to 1999, landings of spiny dogfish were managed under the Multi-species FMP. The effects of fisheries targeting spiny dogfish on listed species were therefore considered within the broad scope of fisheries prosecuted under the Multi-species FMP.

The first formal section 7 consultation on NMFS' approval of the Spiny Dogfish FMP was completed on August 13, 1999, and concluded that fishing activities conducted under the FMP and its implementing regulations were not likely to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS or result in the destruction or adverse modification of right whale critical habitat. For endangered whales, this conclusion was based on the assumption that the incorporation of measures identified in the ALWTRP into NMFS' management of fisheries under the Spiny Dogfish FMP would be effective at reducing incidental mortality and serious injury of the whales to insignificant levels approaching zero mortality and serious injury rate. This conclusion was also based on NMFS' December 13, 1996, Opinion which identified implementation of the ALWTRP as an effective reasonable and prudent alternative to avoid the likelihood of jeopardy for fisheries managed under the Multi-species FMP. Based on these assumptions, NMFS' August 13, 1999, Opinion concluded that prosecution of fisheries under the Spiny Dogfish FMP consistent with the existing ALWTRP were not likely to jeopardize the continued existence of listed whales.

On May 4, 2000, NMFS' Office of Protected Resources, Northeast Region requested reinitiation of formal section 7 consultation with the Northeast Region's Office of Sustainable Fisheries on the continued authorization of several fisheries operating under the ALWTRP, including those managed under the Multispecies FMP, Spiny Dogfish FMP, and Monkfish FMP. NMFS' Office of Protected Resources also requested NMFS' Office of State, Federal, and Constituent Programs reinitiate formal consultation on the continued authorization of the American Lobster FMP on June 20, 2000. Consultation on these particular FMP's was requested in order to re-evaluate the potential impact of fisheries on the western Atlantic right whale and to assess the effectiveness of components of the ALWTRP which were included as reasonable and prudent alternatives identified in earlier Opinions or incorporated into the continued operation of the fisheries to avoid the likelihood of jeopardy to the right whale. NMFS' request for reinitiation of consultation on these fisheries followed a determination by the Atlantic Large Whale Take Reduction Team (ALWTRT) to reassess components of the ALWTRP and consider modifications to further reduce the threat of entanglements in fixed gear.

Following the occurrence of several right whale entanglements including at least one death in 1999, NMFS' concurred with the ALWTRT that modification of the ALWTRP was necessary. These entanglements were in addition to observations of two additional right whale deaths within the year (in 1999 a right whale was killed in a ship collison; in early 2000 another right whale observed dead of unknown causes). In the latter case, poor weather conditions prevented recovery of the floating carcass, however, rope was observed on its flukes suggesting that gear entanglement contributed to the animal's death. NMFS concluded that the last event also provides evidence that not all carcasses wash ashore and observed right whale deaths are a minimum count of human-related mortality.

These right whale mortalities were of additional concern to NMFS in light of new information received from the International Whaling Commission (IWC). Results of several models used to determine the trend of the western North Atlantic right whale population presented at a recent IWC workshop all indicated that this population is in an overall declining trend in survival. Recommendations from the workshop included 1) managers take all possible steps to reduce human-related mortality, and 2) it would be inappropriate to wait for further modeling or population research to take action.

Given these developments, NMFS' determined that "it was clear that: (a) whales are still becoming entangled in fixed gear, (b) disentanglement efforts remain our primary method for preventing serious injury and mortality of whales due to entanglement, but are not (and may never be) 100% effective, and c) the current ALWTRP measures are not adequate to reduce the threat from entanglements. Since the ALWTRP is currently the primary measure for eliminating the likelihood of jeopardy in several Northeast and Mid-Atlantic fisheries, we believe it prudent that the consultations for these FMP's be reinitiated to see if the basis for the determinations in the Biological Opinions is still valid."

Since the Spiny Dogfish fishery is prosecuted using gear similar to that reported to have entangled and killed a right whale in 1999 and NMFS has been unable to assign responsibility to any specific fishery for the entanglement, new information has been received regarding the status of right whales in the western North Atlantic, and the ALWTRP has been revised to modify the conduct of affected fisheries, NMFS' Northeast Protected Resources Division (PRD) is currently conducting section 7 consultation on fisheries managed under the Spiny Dogfish, Multi-species, Monkfish, and American Lobster FMP's. In requesting reinitiation of formal consultation on the Spiny Dogfish FMP, NMFS' determined that at least two of the reinitiation criteria had been triggered: 1) the action has been modified in a manner that causes an effect to the listed species or critical habitat not considered in the Opinion; and 2) new information was available that reveals effects that may affect listed species or critical habitat in a manner or to an extent not previously considered. NMFS' memorandum to the Northeast Sustainable Fisheries Division requesting reinitiation of section 7 consultation on the continued authorization of fisheries managed under the Spiny Dogfish FMP dated May 4, 2000; and an additional memorandum dated August 1, 2000, requested information on any changes to NMFS' management of the Spiny Dogfish fishery since completion of the August 13, 1999, formal consultation. On August 29, 2000, staff representing NMFS' Protected Resources and Sustainable Fisheries Divisions met to discuss information needed to complete consultation.

Compliance with Past Requirements under Previous Consultation

As previously described, the ALWTRP measures - published on July 22, 1997 in interim form and in a final rule on February 16, 1999 - which were identified as a reasonable and prudent alternative in NMFS' July 15, 1997, Opinion on the Multispecies fisheries, were incorporated into NMFS' implementation of the Spiny Dogfish FMP to avoid the likelihood of jeopardy to right whales from gillnet gear. NMFS' implementation of reasonable and prudent measures and conservation recommendations were also reviewed in a memo dated August 1, 2000, prepared by staff of the Northeast Protected Resources Division to determine whether these measures had been implemented. As a result of this review, NMFS' Protected Resources Division determined that the several of the reasonable and prudent measures and conservation recommendations have not been fully implemented.

II. DESCRIPTION OF THE PROPOSED ACTION

The proposed action considered in this Opinion is NMFS' Northeast Region's Office of Sustainable Fisheries' continued authorization of fisheries managed under the Spiny Dogfish Fishery Management plan, consistent with all applicable regulations including the ALWTRP and Harbor Porpoise Take Reduction Plan (HPTRP). Effective April 3, 2000, NMFS' approved and implemented the first Spiny Dogfish FMP. Until that time, NMFS had not implemented any management measures or proposed any Federal regulations pertaining to the harvest of spiny dogfish. With the implementation of the Spiny Dogfish FMP, a restrictive commercial quota went into effect for the entire dogfish management area. The quota was broken down into two semi-annual periods; May 1 through October 31, and November 1 through April 30. The Federal spiny dogfish fishery for period 1 was closed effective August1, 2000. Due to large overages in landings from period 1, the period 2 quota was harvested prematurely and the fishery has remained closed through most of the consultation period. The spiny dogfish fishery reopened May 1, 2001. A complete copy of the regulations can be obtained at the Northeast Regional Office by calling (978) 281-9278, or by accessing the website at: http//www.nero.nmfs.gov/ro/doc/nero.html. A summary of the characteristics of the fishery relevant to the analysis of its potential effects on threatened and endangered species is presented below.

A. Description of the Current Fishery for Spiny Dogfish

Spiny dogfish are distributed on both sides of the Atlantic Ocean. In the Northwest Atlantic, they range from Labrador to Florida, but are most abundant from Nova Scotia to Cape Hatteras. They migrate seasonally, moving north in spring and summer, and south in fall and winter. Canadian research surveys indicate that spiny dogfish are distributed throughout the Canadian Maritimes during the summer months. The stock is concentrated in U. S. waters during the fall through spring.

In 1999, 596 vessels reported spiny dogfish landings to NMFS, which may be an estimate of the number of vessels that will be involved in the fishery in the foreseeable future. However, any of the 2,815 vessels that obtained Federal spiny dogfish permits (all open access) in 2000 could potentially land dogfish. Open access permits are open to anyone. Massachusetts, North Carolina, Maryland, Maine, and New Jersey accounted cumulatively for 90 percent of dogfish landings from 1988 through 1997. Most of these vessels (87 percent) also participate in other fisheries, including Multispecies, summer flounder, squid, mackerel, butterfish, lobster, scallop and tuna (MAFMC and NEFMC 2000)

Spiny dogfish are landed in every state from Maine to North Carolina and in all months of the year. However, the distribution of those landings varies by area and season. During the fall and winter months, spiny dogfish are landed principally from Mid-Atlantic waters and southward from New Jersey to North Carolina. During the spring and summer months, spiny dogfish are landed mainly from northern waters from New York to Maine. Overall, Massachusetts and North Carolina recorded the highest landings of spiny dogfish between 1988 and 1997, with 55 percent and 16 percent, respectively, of the landings. These two states were followed by Maryland, Maine, New Jersey, Rhode Island, New Hampshire, and Virginia (MAFMC 1999). Four ports comprised 44 percent of the 1996 spiny dogfish landings: Chatam, Massachusetts (14 percent), Plymouth, Massachusetts (12 percent), Ocean City, Maryland (12 percent), and Gloucester, Massachusetts (6 percent).

Spiny dogfish landings by water area (state vs. EEZ) were available from the NMFS weighout data base prior to 1994. However, beginning in 1994, NMFS port agents no longer routinely collected distance from shore information (C. Yustin, pers. comm.). Based on historical weighout data prior to 1994, the vast majority of spiny dogfish landings were taken from the EEZ. Beginning in 1994, only a fraction of the total landings can be assigned to a distance from shore category (i.e., only North Carolina landings) based on NMFS weighout data. Since then, there appears to be a shift in the spiny dogfish fishery to inshore waters based on North Carolina landings. However, a preliminary analysis of vessel trip report (VTR) data indicates that there has been a shift in the fishery to inshore waters during recent years. Using the location fished information from the VTR data to prorate total landings from the weighout data, a preliminary analysis supplied to council staff from the NMFS' Northeast Regional Office indicated that the fishery has shifted inshore based on 1996 and 1998 VTR data. Based on this analysis, from 65-67% of the landings were estimated to originate from state waters in 1996 and 1998. However, since directed spiny dogfish fishermen were not required to submit logbook information in 1996 and 1998, the degree to which the VTR data are representative of the directed spiny dogfish fishery is unknown.

Numerous gear types are reported to take spiny dogfish, including sink gillnet, bottom otter trawl, bottom longline and drift gill net based on NMFS weighout data. However, two principal gear types, trawls and gillnets, historically account for the majority of spiny dogfish commercial landings. Sink gillnets are the primary gear used, comprising about 79 percent of commercial landings in both state and federal waters; 11 percent of landings were caught with otter trawls (USDC weighout file 1995).

Thus, the dramatic increase in spiny dogfish landings in recent years is due largely to an increase in gill net activity within the fishery. While this is not necessarily an indication of effort, it gives some indication of the relative use of the various fishing gears in both state and federal waters.

As mentioned above sink gillnets are the primary gear used to catch dogfish. Each net consists of a float line and a lead line to which monofilament webbing is attached or "hung". The webbing in the fishery typically ranges from 6 to 8 inches in mesh size and is mostly 14 gage thickness. At the end of each net the float line attaches to the lead line forming bridles to which the next net in the string is attached. The end nets of the string are anchored and attached to the surface buoy line. Polypropylene (floating) line is used between the anchor line and surface line to prevent chafing. Sink gillnet gear is designed to be, or is fished on or near the bottom in the lower third of the water column.

Bottom trawls are cone-shaped nets which are towed on the bottom. Bottom trawls employ, large rectangular doors attached to the two cables used to tow the net to keep the net open while deployed. The bottom of an otter trawl mouth is footrope or groundrope that can bear many heavy (tens to hundreds of kilograms) steel weights (bobbins) that keep the trawl on the seabed. Bottom trawls may be constructed with large (to 40 cm diameter) rubber discs or steel bobbins (rockhoppers) that ride over structures such as boulders and coral heads that might otherwise snag the net. Some trawls are constructed with tickler chains that disturb the seabed to flush shrimp or fishes into the water column to be caught by the net. The constricted posterior netting of a trawl is called the cod end.

The Spiny Dogfish FMP contains a restrictive rebuilding schedule which requires that fishing mortality rates support only incidental catch of dogfish until the stock is rebuilt. The FMP requires the Mid-Atlantic and New England Fishery Management Councils (Councils) to annually recommend a commercial quota and, possibly, other measures, to assure that the fishing mortality rate specified in the FMP will not be exceeded. The commercial quota is to be specified on an annual basis for the fishing year that extends from May 1 - April 30. The quota is divided into 2 periods, with May 1 - October 31 being allocated 57.9% of the total quota and November 1 - April 30 being allocated 42.1% of the total quota. After the quota for each period has been reached, there will be a prohibition on landings by vessels with federal permits during any days remaining in a semi-annual period. The commercial quota applies throughout the spiny dogfish management unit, in both state and federal waters. As of August, 2000, the quota for dogfish was reached and the fishery remained closed until May 1, 2001. The Spiny Dogfish fishery reopened on May 1, 2001.

The Mid-Atlantic and New England Fishery Management Councils submitted the proposed specifications for the 2001 spiny dogfish fishery. The councils proposed a 4.5 million lb quota, with 500,000 lb to be set-aside for experimental fishing projects. The remaining 4.0 million lb commercial quota would be distributed between the two semi annual periods. In addition to set quotas, the MAFMC proposed to establish trip limits of 600 lb/trip for quota period 1, and 300 lb/trip for quota period 2 for FY 2001. This is the same as the trip limits set in FY2000. The New England Council proposed a trip limit of 5,000 lb/trip for both quota periods. The estimated closure dates of the quota periods depend on implementation of a trip limit. If the lower trip limits were implemented then it is estimated that dogfish landings would continue year round. If the 5,000 lbs. trip limit was implemented, the quota could be reached quicker in each quota period and the season would close sooner than under the lower trip limit. NMFS proposed a commercial spiny dogfish quota of 4 million lb (1.81 million kg) for the 2001 fishing year and to implement the possession limits that were recommended by the Monitoring Committee and the MAFMC. These limits are: 600 lb (272 kg) for period 1, and 300 lb (136 kg) for period 2, which was implemented as the specifications on May 1, 2001.

The stock recovery schedule for the proposed fishery specifies mandatory reductions in spiny dogfish fishing mortality which will result in reductions in fishing effort directed at spiny dogfish. The rebuilding schedule for dogfish includes a 6-month "exit fishery" during the initial phase of the plan corresponding to the second half of Year 1. (The duration of the rebuilding period, and consequently the exit fishery, was decreased by 6 months due to a delay in implementation of the FMP.) The exit fishery was followed by a substantial reduction in the annual commercial quota for Year 2. The quota allocated for the initial one-year exit fishery was expected to result in a 30 percent reduction from 1997 effort levels, with a reduction of greater than 90 percent expected for the quotas allocated for the remaining years of the rebuilding period. This latter reduction is expected to essentially curtail the directed fishery as the landings are likely to be below the threshold of economic viability for processors, who may cease to purchase dogfish. For the last four years of the rebuilding period, dogfish landings are likely to be limited to incidental catch in other fisheries.

Quotas would be expected to increase after the rebuilding period. However, the fishery may not return to its current level of effort. The Councils estimate that effort after the rebuilding period will not exceed 30 percent of current levels.

In the Mid-Atlantic, fishing effort may be transferred to other fisheries such as the weakfish, croaker, or king whiting fisheries or any other fisheries into which access is not currently limited. Vessels throughout the management unit may also transfer effort into regulated fisheries for which they currently possess permits.

Supporting Administrative Measures:
The FMP for spiny dogfish identifies several administrative measures that will be used to support the proposed fishery. These measures include:

- prohibition of "finning" (removing fins and discarding carcasses)
- framework adjustment process
- establishment of spiny dogfish monitoring committee
- annual FMP review
- permit and reporting requirements for commercial vessels, operators and dealers
- other measures regarding sea samplers, foreign fishing, and exempted fishing activities

Monitoring of dogfish fishing effort will be conducted through permit records, fishing vessel logbooks, and dealer reports. Many current FMPs already require permit holders to report dogfish catch on logbooks used for those other fisheries, so most dogfish vessels would already be reporting dogfish effort prior to implementation of the Dogfish FMP. Some degree of active effort monitoring will also be conducted through sea sampling coverage. Identification of these vessels and associated fishing effort will facilitate future analyses of impacts on listed species and improve capabilities for placing observers in the fleet.

The Dogfish FMP does not currently contain requirements for rigging or marking of surface gear used by fixed gear vessels, except some vessels may be subject to multispecies gear marking regulations. In addition, no gillnet tags will be required. The gillnet tagging requirement under the Multispecies FMP is part of an effort control measure involving caps on the number of gillnets which can be deployed per vessel. In the proposed Dogfish FMP, gillnet caps were deemed unnecessary due to the heavy effort reduction which will result from the quota reduction schedule.

B. Modifications to Spiny Dogfish fisheries required by the ALWTRP

Although the ALWTRP and Harbor Porpoise Take Reduction Plan (HPTRP) are not part of NMFS's proposal to continue management of fisheries under the Spiny Dogfish FMP, these regulations directly influence NMFS' prosecution of the gillnet sector of fisheries targeting spiny dogfish. These regulations also contain several non-regulatory components (i.e., aerial surveys, disentanglements) which may indirectly influence any adverse effects the spiny dogfish fishery may have on listed species. Although the ALWTRP and HPTRP are continuing actions which are described in detail in the Environmental Baseline section of this Opinion, the proposed action considered in this Opinion is NMFS' prosecution of fisheries under the Spiny Dogfish FMP, as modified by the ALWTRP and HPTRP. NMFS has completed consultation on implementation of the ALWTRP, and the Interim Final Rule for Gear Modifications to the plan (NMFS 1997, NMFS 2000).

This Opinion considers the prosecution of fisheries under the Spiny Dogfish FMP, as modified by the new measures established by the ALWTRP - published as an interim final rule on December 21, 2000 and effective February 21, 2001. Since NMFS' has already completed consultation on the revisions to the ALWTRP, which affects the conduct of several other NMFS' managed fisheries as well, the continued implementation of the ALWTRP is considered in the Environmental Baseline section of this Opinion. The new measures established by the ALWTRP that apply to gillnet fisheries conducted under the Spiny Dogfish FMP include:

- new gear requirements for sink gillnet fisheries east of 72º30'W Longitude, including knotless weak links at the buoy with a breaking strength of 1,100 lb or less, weak links placed in the headrope (floatline) at the center of each net panel, anchoring of net strings that contain 20 net panels or less using one of three anchoring systems, and required gear marking midway on the buoy line; and,
- eliminating the Gillnet Gear Technology List for all gillnet gear set in the Northeast.

The gillnet section of the interim final rule only implements gear modifications for anchored gillnet gear in New England. The new measures do not apply to gillnet gear set in state waters or in Federal waters in the mid-Atlantic or southeast. Finally, all fishermen are encouraged, but not required, to maintain their buoy lines to be as knot-free as possible and encouraged to use splices in lieu of knots. The impact of the ALWTRP on threatened and endangered species is discussed further in the *Environmental*

Baseline of this Opinion (Section IV). NMFS assumes in this Opinion that all ongoing regulatory and non-regulatory elements of the ALWTRP will continue to be implemented in the future and provide continued important conservation benefits to listed whales. In the event that any of these actions are discontinued or not implemented at existing levels (i.e., funding of disentanglement network), NMFS will reinitiate consultation on the Spiny Dogfish fishery to evaluate if these modifications cause any effects to listed species not considered in this Opinion.

C. Action Area

The management unit for the Dogfish FMP is the spiny dogfish population along the U.S. East Coast from Maine through Florida (Figure 1). Thus, the action area includes all waters within the United States Exclusive Economic Zone (EEZ) along the East Coast. However, the primary geographic area affected by the commercial fishery includes the federal waters of the Continental Shelf from Maine through North Carolina.

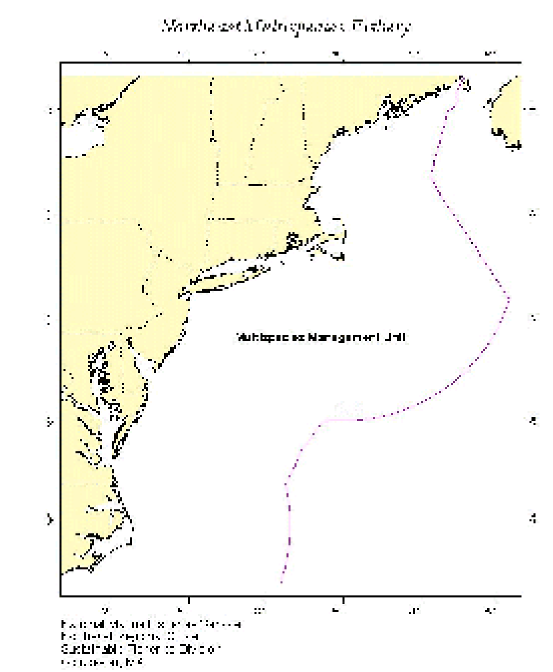

Figure 1. EEZ of the Dogfish Management Unit

III. Status of the Species/Critical Habitat

NMFS has determined that the action being considered in the Opinion may adversely affect the following species and/or their critical habitat(s) provided protection under the ESA.

Cetaceans

Right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered

Sea Turtles

Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*[1])	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered

Critical Habitat Designations

Right whale	Cape Cod Bay and Great South Channel portions of North Atlantic right whale critical habitat

NMFS has determined that the action being considered in the Opinion is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum*), or the Gulf of Maine distinct population segment (DPS) of Atlantic salmon (*Salmo salar*), both of which are listed as endangered species under the Endangered Species Act of 1973. The following discussion is NMFS's rationale for these determinations.

1. *Shortnose sturgeon.* Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. They can be found in large rivers along the western Atlantic coast from St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (*i.e.,* south of Chesapeake Bay), while some northern populations are amphidromous (NMFS 1998b). There have been no documented cases of shortnose sturgeon taken in dogfish gear, or fisheries in similar locations and/or gear types.

   Since operation of the spiny dogfish fishery does not occur in or near the rivers where concentrations of shortnose sturgeon are most likely to be found, it is highly unlikely that the action being considered in this Opinion will adversely affect shortnose sturgeon. Thus, this species will not be considered further in this Opinion.

2. *Atlantic salmon.* The recent ESA-listing for Atlantic salmon covers the wild population of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.-

[1]Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

Canada border. These include the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Atlantic salmon are an anadromous species; spawning and juvenile rearing occur in freshwater rivers followed by migration to the marine environment. Juvenile salmon in New England rivers typically migrate to sea in May after a two to three year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn from mid October through early November. While at sea, salmon generally undergo extensive migrations to waters off Canada and Greenland. Data from past commercial harvest indicate that post-smolts overwinter in the southern Labrador Sea and in the Bay of Fundy.

The numbers of returning wild Atlantic salmon within the Gulf of Maine DPS are perilously small with total run sizes of approximately 150 spawners occurring in 1999 (Baum 2000). Capture of Atlantic salmon in U.S. commercial fisheries or by research/survey vessels have occurred. However, none have been documented after 1992. Previous captures included one capture of an Atlantic salmon in a Gulf of Maine gillnet in June 1990 and one by trawl gear in southern New England in June 1992, and the take of two juvenile Atlantic salmon during Northeast Fisheries Science Center (NEFSC) research vessel surveys conducted in December 1977 during a bottom trawl survey in the Gulf of Maine and one during a cooperative silver hake research cruise by the Soviet vessel Argus in southern New England in February 1978. The take of six Atlantic salmon by a single vessel fishing off the coast of Rhode Island (stat area 537) in November 1992 was also recorded by the NEFSC, however there is a strong possibility that these fish were either misidentified or misrecorded given the time of year and weights recorded.

Since operation of the dogfish fishery does not occur in or near the rivers where concentrations of Atlantic salmon are most likely to be found, it is highly unlikely that the action being considered in this Opinion will adversely affect the Gulf of Maine DPS of Atlantic salmon. Thus, this species will not be considered further in this Opinion.

3. NMFS has also determined that the action being considered in the Opinion may affect, but is not likely to adversely affect critical habitat that has been designated for the right whale, for the following reasons:

All of the habitats used by North Atlantic right whales have not been identified. Genetics work performed by Schaeff et al., (1993) suggested the existence of at least one unknown nursery area. Satellite tracking efforts have also identified individual animals embarking on far-ranging excursions (Knowlton et al., 1992 and Mate et al., 1997). Within the known distribution of the species, however, the following five areas have been identified as critical to the continued existence of the species: (1) coastal Florida and Georgia; (2) the Great South Channel, which lies east of Cape Cod; (3) Cape Cod and Massachusetts Bays; (4) the Bay of Fundy; and (5) Browns and Baccaro Banks off southern Nova Scotia. The first three areas occur in U.S. waters and have been designated by NMFS as critical habitat (59 FR 28793). Whales are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990;

Schevill et al., 1986; Watkins and Schevill 1982), in the Great South Channel in May and June (Kenney et al., 1986, Payne et al., 1990), and off Georgia/Florida from mid-November through March (Slay et al., 1996).

NMFS evaluated the potential effects of the proposed Federal lobster fisheries on prey availability and quality or nursery protection in critical habitat that has been designated in the Great South Channel and Cape Cod Bay. NMFS was concerned that the lobster fishery in the Great South Channel and Federal portion of the Cape Cod Bay could diminish the value of critical habitat by altering trophic dynamics which could reduce the availability of right whale prey within the critical habitat. However, as right whales feed primarily on copepods, this seemed highly unlikely.

NMFS was also concerned that the increased risk of entanglement of right whales, in the Cape Cod Bay and Great South Channel critical habitats. Prey availability attracts concentrations of right whales and is what makes these areas critical habitats. Setting fishing gear in these areas during peak right whale use could be viewed as diminishing the value of the critical habitat by increasing the risk of entanglement. However, time-area restrictions and closures of lobster gear during peak right whale use, may offset this risk. The critical habitat restrictions are intended to minimize the likelihood that the lobster fishery will appreciably diminish the value of designated right whale critical habitat of the. Furthermore, NMFS views the potential increased risk of entanglement in the designated critical habitat as part of its jeopardy analysis rather than as part of its adverse modification analyses.

Although the physical and biological processes shaping acceptable right whale habitat are poorly understood, there was no evidence that suggest that the operation of the Federal lobster fishery had any adverse effects on the value of critical habitat designated for the right whale.

This remainder of this section will focus on the status of the various species within the action area, summarizing the information necessary to establish the environmental baseline to assess the effects of the proposed action. Additional background information on the range-wide status of these species can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995, USFWS 1997, Marine Turtle Expert Working Group - TEWG, 1998 & 2000), recovery plans for the humpback whale (NMFS 1991a), right whale (1991b), loggerhead sea turtle (NMFS and USFWS 1991) and leatherback sea turtle (NMFS and USFWS 1992) and the 2000 Marine Mammal Stock Assessment Report (SAR) (Waring et al., 2000).

A. Status of whales

1. Right Whale (*Eubalaena glacialis*) - Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes. NMFS recognizes three major subdivisions of right whales: North Pacific, North Atlantic, and Southern Hemisphere. NMFS further recognizes two extant subunits in the North Atlantic: eastern and western. A third subunit may have existed in the central Atlantic (migrating from east of Greenland to the Azores or Bermuda), but this stock appears to be extinct (Perry et al. 1999). Because of our limited understanding of the genetic structure of the entire species, the most conservative approach to this species would treat these right whale subunits as recovery units whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood that one or more of these right whale recovery units would survive and recover in the wild would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will focus on the western North Atlantic recovery unit of right whales, which occurs in the action area.

Of all of the large whales, the western north Atlantic right whale has the highest risk of extinction in the near future. The scarcity of right whales is the result of an 800-year history of whaling that continued into the 1960s (Klumov 1962). In the North Atlantic, records indicate that right whales were subject to commercial whaling as early as 1059. Between the 11^{th} and 17^{th} centuries an estimated 25,000-40,000 North Atlantic right whales are believed to have been taken. The size of the western North Atlantic right whale population at the termination of whaling is unknown. The stock was recognized as seriously depleted as early as 1750. However, right whales continued to be taken in shore-based operations or opportunistically by whalers in search of other species as late as the 1920's. By the time the species was internationally protected in 1935 there may have been fewer than 100 North Atlantic right whales in the western Atlantic (Hain 1975, Reeves et al., 1992, Kenney et al., 1995 in Waring et al., 1999).

Intense whaling was likely the first step toward the critically endangered status of North Atlantic and North Pacific right whales. Currently, the North Pacific population is so small that no reliable estimate can be given, and the eastern subpopulation of the North Atlantic population may already be extinct. The western North Atlantic subpopulation is the most numerous of the North Atlantic right whales but is estimated to number approximately 300 animals. North Atlantic right whales have been protected for more than 50 years from the pressures of whaling, yet most stocks show no evidence of recovery. The southern right whale, in contrast, is recovering with a growth rate of 7% in many areas.

Right whales appear to prefer shallow coastal waters, but their distribution is also strongly correlated to the distribution of their prey (zooplankton). In both northern and southern hemispheres, right whales are observed in the lower latitudes and more coastal waters during winter, where calving takes place, and then tend to migrate to higher latitudes during the summer. The distribution of right whales in summer and fall in both hemispheres appears linked to the distribution of their principal zooplankton prey (Winn et al., 1986). About half of the North Atlantic right whale's known geographic range is within the action area for this consultation. They generally occur in Northwest Atlantic waters west of the Gulf Stream and are most commonly associated with cooler waters ($\leq$21°C). They are not found in the Caribbean and have been recorded only rarely in the Gulf of Mexico.

Right whales are skim feeders but evidence exists that they feed on zooplankton through the water column, and in shallow waters may feed near the bottom (Merrick 2001, pers. comm.). In the Gulf of Maine they have been observed feeding on zooplankton, primarily copepods, by skimming at or below the water's surface with open mouths (NMFS 1991b; Kenney et al., 1986; Murison and Gaskin 1989; and Mayo and Marx 1990). Research suggests that right whales must locate and exploit extremely dense patches of zooplankton to feed efficiently (Waring et al., 1999). New England waters include important foraging habitat for right whales and at least some portion of the North Atlantic right whale population is present in these waters throughout most months of the year. They are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill et al., 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Kenney et al., 1986, Payne et al., 1990) where they have been observed feeding predominantly on copepods, largely of the genera *Calanus* and *Pseudocalanus* (Waring et al., 1999). Right whales also frequent Stellwagen Bank and Jeffrey's Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro Banks, in the spring and summer months. Mid-Atlantic waters are used as a migratory pathway from the spring and summer feeding/nursery areas to the winter calving grounds off the coast of Georgia and Florida.

NMFS designated right whale critical habitat on June 3, 1994 (59 FR 28793) to help protect important right whale foraging and calving areas within the U.S. These include the waters of Cape Cod Bay and the Great South Channel off the coast of Massachusetts, and waters off the coasts of southern Georgia and northern Florida. In 1993, Canada's Department of Fisheries declared two conservation areas for right whales; one in the Grand Manan Basin in the lower Bay of Fundy, and a second in Roseway Basin between Browns and Baccaro Banks (Canadian Recovery Plan for the North Atlantic Right Whale 2000).

There is, however, much about right whale movements and habitat that is still not known or understood. Approximately 85% of the population is unaccounted for during the winter (Waring et al., 1999). Telemetry technology, used to track whales, has shown lengthy and somewhat distant excursions into deep water off of the continental shelf (Mate et al., 1997). In addition photographs of identified individuals have documented northern movements as far as Newfoundland, the Labrador Basin and southeast of Greenland (Knowlton et al., 1992). During the winter of 1999/2000, appreciable numbers of right whales were recorded in the Charleston, SC area. Because survey efforts in the mid-Atlantic have been limited, it is unknown whether this is typical or whether it represents a northern expansion of the normal winter range, perhaps due to unseasonably warm waters. However, historical sighting data uncorrected for effort do show a concentration of sightings in this area. It is hoped that additional insight into the movements of right whales will be gained in the near future. Sixteen satellite tags were attached to right whales in the Bay of Fundy, Canada, during summer 2000 in an effort to further elucidate the movements and important habitat for North Atlantic right whales. The movements of these whales varied, with some remaining in the tagging area and others making periodic excursions to other areas before returning to the Bay of Fundy. Several individuals were observed to go to the coastal waters of Maine, while others traveled to the Scotian Shelf. One individual was successfully tracked throughout the fall, and was followed on her migration to the Georgia/Florida wintering area.

There has been significant discussion regarding attempts to determine the current status and trend of the very small western North Atlantic right whale population and to make valid recommendations on recovery requirements. Currently, staff of the North Atlantic Right Whale Catalogue consider any individual right whale not observed for six years to be dead, and their estimates of unobserved mortality are made on this basis (Knowlton and Kraus 2001). That the six-year criterion is not always accurate is evident in the reappearance of some individuals after a six-year hiatus in sightings; this phenomenon is partly linked to heterogeneity of distribution together with variation in survey effort, notably in offshore locations such as the Great South Channel. Other methods for estimating survival and mortality do not rely upon this assumption (Caswell et al. 1999). Knowlton et al. (1994) concluded, based on data from 1987 through 1992, that the western North Atlantic right whale population was growing at a net annual rate of 2.5% (CV = 0.12). This rate was also used in NMFS' marine mammal Stock Assessment Reports (e.g., Blaylock et al. 1995, and Waring et al. 1997). Since then, the data used in Knowlton et al. (1994) have been re-evaluated, and new attempts to model the trends of the western North Atlantic right whale population have been published (e.g., Kraus 1997; Caswell et al. 1999).

Recognizing the precarious status of the right whale, the continued threats present in its coastal habitat throughout its range, and the uncertainty surrounding attempts to characterize population trends, the International Whaling Commission (IWC) held a special meeting of its Scientific Committee from March 19-25, 1998, in Cape Town, South Africa, to conduct a comprehensive assessment of right whales worldwide. The workshop's participants reviewed available information on the North Atlantic right whale, including Knowlton et al. (1994), Kraus (1997), and Caswell et al. (1999). The conclusions of Caswell et al. (1999) were particularly alarming. Using data on reproduction and survival through 1996, Caswell et al. (1999) determined that the western North Atlantic right whale population was declining at a rate of 2.4% per year. One model used suggested that the mortality rate of the right whale population has increased five-fold in less than one generation. According to Caswell et al. (1999), if the mortality rate as of 1996 does not decrease and the population performance does not improve, extinction could occur in 191 years and would be certain within 400 years.

The IWC Workshop participants expressed "considerable concern" in general for the status of the western North Atlantic right whales. Based on recent (1993-1995) observations of near-failure of calf production, the significantly high mortality rate, and an observed increase in the calving interval, it was suggested that the slow but steady recovery rate published in Knowlton et al. (1994) may not be continuing. Workshop participants urgently recommended increased efforts to determine the trajectory of this right whale population, and NMFS' Northeast Fisheries Science Center has initiated several efforts to implement that recommendation. The 1998 IWC workshop participants also established an inter-sessional Steering Group to review Caswell et al. (1999) and several other ongoing assessment efforts to identify the best and most current available scientific information on population status and trends. The IWC Scientific Committee met in May 1999 to discuss the Steering Group's report and noted that there were several potential negative biases in Caswell et al. (1999), but agreed that the results of the study should be considered in management actions. Additional studies to evaluate the status of north Atlantic right whales are also in progress (Caswell et al., in prep; Wade and Clapham, in prep). For the purposes of this Opinion -- and until the new status and trend information has been thoroughly reviewed for assimilation into NMFS management programs -- NMFS will continue to adopt the risk averse assumption that the North Atlantic right whale population is declining.

In addition to the concerns of the high mortality rate for North Atlantic right whales, there is also growing concern over the decline in birth rate. In the three calving seasons following Caswell *et al.*'s (1999) analysis, only 10 calves are known to have been born into the population. There was only one known right whale birth in the 1999/2000 season. The 2000/2001 calving season is looking positive with at least 30 right whale calves sighted between December and March (three of which subsequently died of unknown causes). Thirty births is encouraging because these are more right whales calves than scientists have observed in the previous three years combined. However, biologists recognize that there may be some natural mortality with these calves and cautious optimism is necessary because of how close the species is to extinction. These individuals must survive to become adults and successfully breed in order to help reverse the population decline. Of particular concern is the determination that the spacing between calves for each mother has greatly increased, from 3.7 years on average in 1980-1992 to 5.1 years in 1993-1998 (Kenney, 2000). Researchers are examining the potential causes of this apparent reproductive decline. On April 26-28, 2000, a workshop entitled "Causes of Reproductive Failure in North Atlantic Right Whales: New Avenues of Research" was held. The goal of the workshop was to discuss the factors that may be impacting reproduction of North Atlantic right whales, to develop research strategies, and to address the problem. Discussions focused on the following factors as potential contributors to reproductive failure in North Atlantic right whales: 1) environmental contaminants, 2) body condition/nutritional stress, 3) genetics, 4) pathology/infectious disease, and 5) biotoxins. In the end, none of these possible causes could be ruled out. A number of hypotheses will be incorporated into the final report (Right Whale Research News, Spring 2000).

One question that has repeatedly arisen is the effect that "bottlenecking" may have played on the genetic integrity of right whales. Several genetics studies have attempted to examine the genetic diversity of right whales. Results from a study by Schaeff et al. (1997) indicate that North Atlantic right whales are less genetically diverse than southern right whales; a separate population that numbers at least four times as many animals with an annual growth rate of nearly seven percent. A recent study compared the genetic diversity of North Atlantic right whales with the genetic diversity of southern right whales by examining the number of haplotypes present in the respective populations. Using mitochondrial DNA, the researchers found only five haplotypes amongst 180 different North Atlantic right whales, versus 10 haplotypes amongst just 16 sampled southern right whales. In addition, one of the five haplotypes found in the North Atlantic right whales was observed in only four animals; all males born prior to 1982 (Malik et al., 2000). Because the haplotype is passed from female to offspring, there is an expectation that this haplotype will soon be lost from the population. The last known female with this type was the animal killed by the shore fishery at Amagansett, Long Island in 1907. Interestingly, this haplotype is basal to all others worldwide - it's the most ancient.

While such low genetic diversity is of concern, there is a lack of information on how this limited genetic variation might affect the reproduction or survivability of the North Atlantic right whale population. It has been suggested that North Atlantic right whales have been at a low population size for hundreds of years and, while the present population exhibits very low genetic diversity, any lethal effects of harmful genes are thought to have occurred well in the past, effectively eliminating those genes from the population (Kenney, 2000). To help determine how long North Atlantic right whales have exhibited such low genetic diversity, researchers have analyzed mtDNA extracted from museum specimens. Although the sample size was small (n=6), Rosenbaum et al. (2000) found these samples represented four different haplotypes, all of which are still present in the current population. This study suggests that there has not been a significant loss of genetic diversity within the last 100 years and any significant reduction in genetic diversity likely occurred prior to the late 19th century. Researchers hope to be able to analyze samples of right whales taken by Basque whalers in the 16th century to further elucidate when genetic variation might have been lost and, from this, to assess the impact of such a loss on the future of North Atlantic right whales.

The role of contaminants or biotoxins in reducing right whale reproduction has also been raised. Contaminant studies have confirmed that right whales are exposed to and accumulate contaminants, but the effect that such contaminants might be having on right whale reproduction or survivability is unknown. A recent study of organochlorine exposure and bioaccumulation in North Atlantic right whales determined that burdens of these contaminants in the blubber changed annually, presumably due to the ingestion of different prey or prey from distinct locations and the release of some organochlorines stored in blubber during lipid depletion in winter. However, the researchers could not conclude that these contaminant loads were negatively affecting right whales since concentrations were lower than those found in marine mammals proven to be affected by PCB's and DDT's (Weisbrod et al., 2000).

It has been suggested that competition for food resources may be impacting right whale reproduction. Researchers have found that north Atlantic right whales appear to have thinner blubber than right whales from the South Atlantic (Kenney, 2000). However, there is no evidence at present to demonstrate that the decline in birth rate and increase in calving interval is related to a food shortage. It has also been suggested that oceanic conditions affecting the concentration of copepods may in turn have an effect on right whales since they rely on dense concentrations of copepods to feed efficiently (Kenney, 2000). Once again, however, evidence is lacking to demonstrate the relationship between oceanic conditions and copepod abundance to right whale fitness and reproduction rates.

General human impacts and entanglement

Right whales may be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries. However, the major known sources of anthropogenic mortality and injury of right whales include entanglement in commercial fishing gear and ship strikes.

Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57 % of right whales exhibited scars from entanglement and 7% from ship strikes (propeller injuries). This work was updated by Hamilton et al., (1998) using data from 1935 through 1995. The new study estimated that 61.6 percent of right whales exhibit injuries caused by entanglement, and 6.4 percent exhibit signs of injury from vessel strikes. In addition, several whales have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. These numbers are primarily based on sightings of free-swimming animals that initially survive the entanglement. Because some animals may drown or be killed immediately, the actual number of interactions may be higher.

Many of the reports of mortality cannot be attributed to a particular source. The following injury/mortality events are those reported from 1996 to the present for which source was determined. These numbers should be viewed as absolute minimum numbers. The total number of mortalities and injuries cannot be estimated but is believed to be higher since it is unlikely that all carcasses or injured animals will be observed.

1996: One right whale was killed by a ship strike off coastal Georgia. A second right whale was killed by a ship, stranding in the vicinity of Gloucester, MA, after having been entangled in 1995. In addition to these mortalities, there were two confirmed reports of right whales becoming entangled in fishing gear. One of these was deemed to be a "serious injury" (*i.e*., one that was likely to contribute to subsequent mortality of the animal).

1997: A right whale was killed by a ship strike in the Bay of Fundy, and there were 6 confirmed reports of whale entanglements. Four of the entanglements were reported in Canadian waters and 2 in U.S. waters; it should be noted that we only know where 1 of the 6 entanglements occurred (in U.S. waters), and one of the reports may represent a resighting of an earlier entanglement. Two of these entanglements were deemed "serious injuries".

1998: Two adult female right whales were discovered in a weir off Grand Manan Island in the Bay of Fundy on July 12, 1998, and were released two days later; no residual injuries of concern were reported. On July 24, 1998, the Disentanglement Team removed line from around the tail stock of a right whale which was originally seen entangled in the Bay of Fundy on August 26, 1997. This same whale, potentially debilitated from the earlier entanglement, became entangled in lobster pot gear twice in one week in Cape Cod Bay in September 1998. The gear from the latter two entanglements was completely removed, but line from the 1997 entanglement remained in the animal's mouth. On August 15, 1998, a right whale was observed entangled in the Gulf of St. Lawrence; the animal apparently freed itself of most of the gear, but some gear may have remained.

1999: Two right whale mortalities were documented for 1999; one attributed to a ship strike, and the second to a fishing gear entanglement. The first animal was found floating near Truro, Massachusetts, and was towed to the beach for necropsy. Evidence of pre-mortem ship strike injuries and disease were found, and scientists have determined that the whale died from complications of these injuries. The second animal was repeatedly sighted between May and September 1999, and several attempts were made to disentangle the whale. Some line was successfully removed, but other gear, so tightly wrapped that it was cutting into the body, remained. The animal was found dead in October 1999 near Cape May, NJ. Post-mortem investigation suggested that massive traumatic injuries induced by entanglement in sink gillnet gear and starvation were the cause of death.

In addition to these known mortalities, there were at least five other right whale entanglements in 1999. Gear was successfully removed from one animal and partially removed from another. A third animal apparently shed the gear after the gear was marked with a telemetry buoy. The remaining two animals could not be relocated. Finally, one of the animals that was entangled in 1997 and thought to be free of gear later that year (and when seen in 1998) was re-sighted on

April 21, 1999, and appeared to be in poor condition. The role of the 1997 entanglement in the deterioration of the whale's health has not been determined.

2000: Six entangled right whales were observed. Attempts to disentangle were made on three of these. Disentanglement attempts were not made on others either because they did not resight the animal or the entanglement was not considered life threatening. One other animal is suspected of being entangled based on photographs taken in March 2000. However, this could not be confirmed from the photos and the animal has not been resighted to confirm the entanglement. In addition, a dead whale (#2701)was seen floating near Block Island, Rhode Island in February. The carcass was positively identified as a three-year old female and was observed to be entangled in some form of gear. However, the carcass could not be retrieved or further examined due to poor weather conditions, and the cause of death could not be determined.

2001: A right whale calf is known to have died in late-January, though the reasons for its death are unclear, as stranding personnel were unable to recover the carcass. A second confirmed right whale death this year was a young male found washed up on the beach near Assateague Island, VA. A final report of the subsequent examination has not been released yet but several deep cuts consistent with injuries resulting from a boat's propeller were on the carcass. According to field reports, there was no indication that entanglement in fishing gear contributed to the death. On June 8, 2001, aircraft survey observers sighted a northern right whale severely entangled in fishing gear about 80 miles off Massachusetts. The entangled whale, an adult male, has a single polypropylene line, estimated at ¾ inch, wrapped over its upper jaw. The line is cinched tight and is cutting into the tissue causing an infected wound.

It should be noted that no information is currently available on the response of the right whale population to recent (1997-1999) efforts to mitigate the effects of entanglement and ship strikes. However, as noted above, both entanglements and ship strikes have continued to occur. Therefore, it is not possible to determine whether the trend through 1996, as reported in Caswell et al. (1999), is continuing. Furthermore, results reported in Caswell et al. (1999) suggest that it is not possible to determine that anthropogenic mortalities alone are responsible for the decline in right whale survival. However, they conclude that reduction of anthropogenic mortalities would significantly improve the species' survival probability.

The best available information makes it reasonable to conclude that the current death rate exceeds the birth rate in the western North Atlantic right whale population. The nearly complete reproductive failure in this population from 1993 to 1995 and again in 1998 and 1999 suggests that this pattern has continued for almost a decade, though the 2000/2001 season appears the most promising in the past 5 years, in terms of calves born. As of May 4, 2001 the calf count stood at 30 (less three mortalities) compared to only one calf in January 2000. Because no population can sustain a high death rate and low birth rate indefinitely, this combination places the North Atlantic right whale population at high risk of extinction. Coupled with an increasing calving interval, the relatively large number of young right whales (0-4 years) and adults that are killed, and these human-related deaths, extinction could occur within the next 191 years. The recent increase in births gives rise to optimism, however these young animals must be provided with protection so that they can mature and contribute to future generations in order to stabilize the population.

2. Humpback Whale *(Megaptera novaeangliae*) - Humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Six separate feeding areas are utilized in northern waters after their return (Waring et al., 1999). Only one of these feeding areas, the GOM, lies within U.S. waters and is within the action area of this consultation. Most of the humpbacks that forage in the GOM visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CeTAP 1982), and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz, 1999).

Various papers (Clapham and Mayo 1990, Clapham 1992, Barlow & Clapham 1997, Clapham *et al.*, 1999) summarized information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs identified reproductively mature western North Atlantic humpbacks wintering in tropical breeding grounds in the Antilles, primarily on Silver and Navidad Banks, north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (see NMFS, 1991). In general, it is believed that calving and copulation take place on the winter range. Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every 2 to 3 years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years for males. Size at maturity is about 12 meters.

Humpback whales use the mid-Atlantic as a migratory pathway, but it may also be an important feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle et al., 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle et al. (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Those whales using this mid-Atlantic area that have been identified were found to be residents of the GOM and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding stocks in the mid-Atlantic region. A shift in distribution may be related to winter prey availability. Studies conducted by the Virginia Marine Science Museum indicate that these whales are feeding on, among other things, bay anchovies and menhaden. In concert with the increase in mid-Atlantic whale sightings, strandings of humpback whales have increased between New Jersey and Florida since 1985. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley et al., 1995). Six of 18 humpbacks for which the cause of mortality was determined were killed by vessel strikes. An additional humpback had scars and bone fractures indicative of a previous vessel strike that may have contributed to the whale's mortality. Sixty percent of those mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley et al., 1993)

New information has become available on the status and trends of the humpback whale population in the North Atlantic. Although current and maximum net productivity rates are unknown at this time, the population is apparently increasing. It has not yet been determined whether this increase is uniform across all six feeding stocks (Waring et al., 1999). For example, the rate of increase has been estimated at 9.0 percent (CV=0.25) by Katona and Beard (1990), while a 6.5 percent rate was reported for the Gulf of Maine by Barlow and Clapham (1997) using data through 1991. The rate reported by Barlow and Clapham (1997) may roughly approximate the rate of increase for the portion of the population within the action area.

A variety of methods have been used to estimate the North Atlantic humpback whale population. Palsboll et al. (1997) studied humpback whales through genetic markers to identify individual humpback whales in the northern Atlantic Ocean. Using breeding ground samples from 1992–1993, Palsboll et al. (1997) estimated the North Atlantic humpback whale population at 4,894 (95% confidence interval (c.i) 3,374 - 7,123) males and 2,804 females (95% (c.i.) 1,776-4,463), for a total of 7,698 whales. However, since the sex ratio in this population is known to be 1:1 (Palsboll et al., 1997), the lower figure for females is presumed to be a result of sampling bias or some other cause for partitioning of the sampling. Photographic mark-recapture analyses from the YONAH (Years of the North Atlantic Humpback) project gave an ocean-basin-wide estimate of 10,600 (95% c.i. = 9,300 - 12,100) and an additional genotype-based analysis yielded a similar but less precise estimate of 10,400 (95% c.i. = 8,000 - 13,600; Smith et al., 1999). The estimate of 10,600 is regarded as the best available estimate for the North Atlantic population.

The NEFSC recommended that NMFS identify the Gulf of Maine feeding stock as the management stock for this population in U.S. waters. The latest (2001 in draft) SAR gives an estimate of abundance for the GOM stock of 816 (C.V. = 0.45). The minimum population estimate for this stock is 568. The SAR acknowledges that this is likely an underestimate. Stock identity of the juveniles found in the Mid-Atlantic is unknown at this time. The NEFSC is funding a study to determine stock identity of these individuals. The results from this work will assist NMFS in determining multiple management units for the U.S. East Coast.

General human impacts and entanglement

The major known sources of anthropogenic mortality and injury of humpback whales include entanglement in commercial fishing gear and ship strikes. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent --- and possibly as many as 78 percent --- of animals in the Gulf of Maine exhibit scarring caused by entanglement. Several whales have apparently been entangled on more than one occasion. These estimates are based on sightings of free-swimming animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher. In addition, the actual number of species-gear interactions is contingent on the intensity of observations from aerial and ship surveys.

Many of the reports of mortality cannot be attributed to a particular impact source. The following injury/mortality events are those reported from 1996 to the present for which impact source was determined. These numbers should be viewed as absolute minimum numbers. The total number of mortalities and injuries cannot be estimated but it is believed to be higher since it is unlikely that all carcasses are observed.

1996: Three humpback whales were killed in collisions with vessels and at least five were seriously injured by entanglement.

1997: Three confirmed humpback whale entanglements were reported. Stranding records from January through December 1997 for the U.S. Atlantic coast include seven stranded/dead floating humpback whales. Two of these mortalities were attributed to ship strikes. This does not include Canadian entanglements.

1998: Fourteen confirmed humpback whale entanglements resulting in injury (n=13) or mortality (n=1) were reported. One of the animals with entanglement injuries stranded dead, but the role of the entanglement in the animal's death was not able to be determined. One additional injury from a vessel interaction was reported; the whale was seen several times after the injury, and exhibited some healing.

1999: A total of eight humpback whales were observed entangled. One animal was completely disentangled, and a second was partially disentangled. There was also one known humpback whale mortality that appeared to be attributable to entanglement in fishing gear. Although no gear was present on the carcass, line marks were clearly visible on the dorsal and ventral surfaces of the tail stock. There were also line marks leading from the right side of the jaw to the ventral grooves, and to the insertion point of the right flipper.

2000: Preliminary data for 2000 indicate that of 29 humpback whales reported to the stranding network, there were 16 possible human interactions (fifteen fishery, one ship) and 13 for which no signs of entanglement or injury were sighted or reported. Of the 15 possible recorded cases of fishery interactions, 14 were alive, of which one was successfully disentangled and another was seen at a later date apparently free of gear. These data have not been fully analyzed to determine causes of mortality (in cases which resulted in death). In most cases, the gear responsible for the entanglement cannot be identified, particularly when the animal is still free-swimming. The type of gear involved in the entanglements have been identified for only one of the animals thus far; a juvenile humpback whale was entangled in sink gillnet gear used to target sea trout.

2001: As of February 12, 2001, of four humpback whales reported to the stranding network, there were two human interactions: one fishery interaction in which the whale was released alive with no gear attached and one ship strike which resulted in mortality. The third animal was a floater which was not recovered and the fourth had no signs of entanglement or injury sighted or reported.

Humpback whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries. Further information on these factors is provided in the Environmental Baseline.

3. Fin Whale (*Balaenoptera physalus*) - Fin whales inhabit a wide range of latitudes between 20-75° N and 20-75° S (Perry et al., 1999). Fin whales spend the summer feeding in the relatively high latitudes of both hemispheres, particularly along the cold eastern boundary currents in the North Atlantic and North Pacific Oceans and in Antarctic waters (IWC, 1992a). Most migrate seasonally from relatively high-latitude Arctic and Antarctic feeding areas in the summer to relatively low-latitude breeding and calving areas in the winter (Perry et al., 1999).

As was the case for the right and humpback whales, fin whale populations were heavily affected by commercial whaling. However, commercial exploitation of fin whales occurred much later than for right and humpback whales. Although some fin whales were taken as early as the 17th century by the Japanese using a fairly primitive open-water netting technique (Perry et al., 1999) and were hunted occasionally by sailing vessel whalers in the 19th century (Mitchell and Reeves, 1983 IN NMFS draft Rec Plan), wide-scale commercial exploitation of fin whales did not occur until the 20th century when the use of steam power and harpoon- gun technology made exploitation of this faster, more offshore species feasible. In the southern hemisphere, over 700,000 fin whales were landed in the 20th century. More than 48,000 fin whales were taken in the North Atlantic between 1860 and 1970 (Perry et al. 1999). Fisheries existed off of Newfoundland, Nova Scotia, Norway, Iceland, the Faroe Islands, Svalbard (Spitsbergen), the islands of the British coasts, Spain and Portugal. Fin whales were rarely taken in U.S. waters, except when they ventured near the shores of Provincetown, MA, during the late 1800's (Perry et al., 1999).

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. Based on the catch history and trends in Catch Per Unit Effort, an estimate of 3,590 to 6,300 fin whales was obtained for the entire western North Atlantic (Perry et al., 1999). Hain et al. (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The latest (2001 in draft) SAR gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362. This is currently an underestimate: we know too little about population structure, and the estimate derives from surveys over a limited portion of the western North Atlantic. There is also not enough information to estimate population trends.

In the North Atlantic today, fin whales are widespread and occur from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic pack ice (NMFS 1998a). A number of researchers have suggested the existence of fin whale subpopulations in the North Atlantic. Mizroch et al. (1984) suggested that local depletions resulting from commercial overharvesting supported the existence of North Atlantic fin whale subpopulations. Others have used genetics information to provide support for the belief that there are several subpopulations of fin whales in the North Atlantic and Mediterranean (Bérubé et al., 1998). In 1976, the IWC's Scientific Committee proposed seven stocks for North Atlantic fin whales. These are: (1) North Norway, (2) West Norway-Faroe Islands, (3) British Isles-Spain and Portugal, (4) East Greenland-Iceland, (5) West Greenland, (6) Newfoundland-Labrador, and (7) Nova Scotia (Perry et al., 1999). However, it is uncertain whether these stock boundaries define biologically isolated units (Waring et al., 1999). The NMFS has designated one stock of fin whale for U.S. waters of the North Atlantic (Waring et al., 1998) where the species is commonly found from Cape Hatteras northward.

During 1978-1982 aerial surveys, fin whales accounted for 24% of all cetaceans and 46% of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring et al, 1998). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain et al., 1992).

Despite our broad knowledge of fin whales, less is known about their life history as compared to right and humpback whales. Age at sexual maturity for both sexes ranges from 5-15 years (Perry et al., 1999). Physical maturity is reached at 20-30 years (Aguilar and Lockyer, 1987 IN draft rec plan). Conception occurs during a 5 month winter period in either hemisphere. After a 12 month gestation, a single calf is born (Mizroch et al., 1984b). The calf is weaned between 6 and 11 months after birth (Perry et al., 1999). The mean calving interval is 2.7 years, with a range of between 2 and 3 years (Agler et al., 1993). Like right and humpback whales, fin whales are believed to use northwestern North Atlantic waters primarily for feeding and migrate to more southern waters for calving. However, the overall pattern of fin whale movement consists of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays, Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indies. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Some populations seem to move with the seasons (e.g. one moving south in winter to occupy the summer range of another), but there is much structuring in fin whale populations that what animals of different sex and age class do isn't at all clear. Neonate strandings along the U.S. mid-Atlantic coast from October through January suggest the possibility of an offshore calving area (Hain et al., 1992).

The overall distribution of fin whales may be based on prey availability. This species preys opportunistically on both invertebrates and fish (Watkins et al., 1984). The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally available (IWC, 1992a). In the western North Atlantic fin whales feed on a variety of small schooling fish (i.e., herring, capelin, sand lance) as well as squid and planktonic crustaceans (Wynne and Schwartz, 1999). As with humpback whales, fin whales feed by filtering large volumes of water for their prey through their baleen plates. Photoidentification studies in western North Atlantic feeding areas, particularly in

Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and between years (Seipt et al., 1990).

As discussed above, fin whales were the focus of commercial whaling, primarily in the 20^{th} century. The IWC did not begin to manage commercial whaling of fin whales in the North Atlantic until 1976 (Sigurjónsson, 1988 IN draft rec plan). In 1987, fin whales were given total protection in the North Atlantic with the exception of a subsistence whaling hunt for Greenland (Gambell, 1993, Caulfield, 1993 IN draft Rec Plan). The IWC set a catch limit of 19 whales for the years 1995-1997 in West Greenland. All other fin whale stocks had a zero catch limit for these same years (IWC, 1995b). However, Iceland reported a catch of 136 whales in the 1988/89 and 1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry et al., 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995.

General human impacts and entanglement
The major known sources of anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. However, many of the reports of mortality cannot be attributed to a particular source. Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. The following injury/mortality events are those reported from 1996 to the present for which source was determined. These numbers should be viewed as absolute minimum numbers; the total number of mortalities and injuries cannot be estimated but is believed to be higher since it is unlikely that all carcasses will be observed. In general, known mortalities of fin whales are less than those recorded for right and humpback whales. This may be due in part to the more offshore distribution of fin whales where they are either less likely to encounter entangling gear, or are less likely to be noticed when gear entanglements or vessel strikes do occur. Fin whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries. Further information on these factors is provided in the Environmental Baseline.

1996: Three reports of ship strikes were received, although this was only confirmed as cause of death for one of the incidents. One entanglement report was received.

1997: Five confirmed reports of entangled fin whales were received by NMFS. Four fin whales were reported as having stranded in the period from January 1, 1997, to January 1, 1998, in the Northeast region; the cause of death was not determined for these animals.

1998: One ship strike mortality and one entanglement mortality were reported.

1999: A total of three fin whales were observed entangled, all in the Bay of Fundy, Canada. One of these was successfully disentangled.

2000: The preliminary data for 2000 indicate two fin whale mortalities, one of which was an apparent shipstrike. The animal had broken ribs and vertebral processes but the data have not yet been formally reviewed to determine the cause of death and whether observed injuries were pre- or post-mortem. No signs of entanglements or injury were reported for the second animal.

2001: Thus far in 2001 (through February 12), two dead fin whales were reported, both of which were possibly involved in ship strikes (one had a broken jaw and the other displayed bruising and broken bones).

4. Sei Whale (*Balaenoptera borealis*) - Sei whales are a widespread species in the world's temperate, subpolar and subtropical and even tropical marine waters. However, they appear to be more restricted to temperate waters than other balaenopterids (Perry et al., 1999). The IWC recognized three stocks in the North Atlantic based on past whaling operations as opposed to biological information: (1) Nova Scotia, (2) Iceland Denmark Strait, (3) Northeast Atlantic (Donovan 1991 IN Perry et al., 1999). Mitchell and Chapman (1977) suggested that the sei whale population in the western North Atlantic consists of two stocks, a Nova Scotian Shelf stock and a Labrador Sea stock. The Nova Scotian Shelf stock includes the continental shelf waters of the northeastern United States, and extends northeastward to south of Newfoundland. The IWC boundaries for this stock are from the U.S. east coast to Cape Breton, Nova Scotia and east to longitude 42° (Waring et al., 1999). This is the only sei whale stock within the action area for this consultation.

Sei whales became the target of modern commercial whalers primarily in the late 19^{th} and early 20^{th} century after stocks of other whales, including right, humpback, fin and blues, had already been depleted. Sei whales were taken in large numbers by Norway and Scotland from the beginning of modern whaling (Draft Recovery Plan, NMFS 1998). More than 700 sei whales were killed off of Norway in 1885, alone. Small numbers were also taken off of Spain, Portugal and in the Strait of Gibraltar beginning in the 1920's, and by Norwegian and Danish whalers off of West Greenland from the 1920's to 1950's (Perry et al., 1999). In the western North Atlantic, sei whales were originally hunted off of Norway and Iceland, but from 1967-1972, sei whales were also taken off of Nova Scotia (Perry et al., 1999). A total of 825 sei whales were taken on the Scotian Shelf between 1966-1972, and an additional 16 were taken from the same area during the same time by a shore based Newfoundland whaling station (Perry et al., 1999). The species continued to be exploited in Iceland until 1986 even though measures to stop whaling of sei whales in other areas had been put into place in the 1970's (Perry et al., 1999). There is no estimate for the abundance of sei whales prior to commercial whaling. Based on whaling records, approximately14,295 sei whales were taken in the entire North Atlantic from 1885 to 1984 (Perry et al., 1999).

Sei whales winter in warm temperate or subtropical waters and summer in more northern latitudes. In the northern Atlantic, most births occur in November and December when the whales are on the wintering grounds. Conception is believed to occur in December and January. Gestation lasts for 12 months and the calf is weaned at 6-9 months when the whales are on the summer feeding grounds (Draft Recovery Plan, NMFS 1998). Sei whales reach sexual maturity at 5-15 years of age. The calving interval is believed to be 2-3 years (Perry et al., 1999).

Sei whales occur in deep water throughout their range, typically over the continental slope or in basins situated between banks (Draft Recovery Plan, NMFS 1998). In the northwest Atlantic, the whales travel along the eastern Canadian coast in autumn, June and July on their way to and from the Gulf of Maine and Georges Bank where they occur in winter and spring. Within the action area, the sei whale is most common on Georges Bank and into the Gulf of Maine/Bay of Fundy region during spring and summer, primarily in deeper waters. Individuals may range as far south as North Carolina. It is important to note that sei whales are known for inhabiting an area for weeks at a time then disappearing for year or even decades; this has been observed all over the world, including in the southwestern GOM in 1986 (Clapham pers. comm. 2001). The basis for this phenomenon is not clear.

Although sei whales may prey upon small schooling fish and squid in the action area, available information suggests that calanoid copepods and euphausiids are the primary prey of this species. There are occasional influxes of sei whales further into Gulf of Maine waters, presumably in conjunction with years of high copepod abundance inshore. Sei whales are occasionally seen feeding in association with right whales in the southern Gulf of Maine and in the Bay of Fundy. However, there is no evidence to demonstrate interspecific competition between these species for food resources. There is very little information on natural mortality factors for sei whales. Possible causes of natural mortality, particularly for young, old or otherwise compromised individuals are shark attacks, killer whale attacks, and endoparasitic helminths. Baleen loss has been observed in California sei whales, presumably as a result of an unknown disease (Perry et al., 1999).

There are insufficient data to determine trends of the sei whale population. Because there are no abundance estimates within the last 10 years, a minimum population estimate cannot be determined for NMFS management purposes (Waring et al., 1999). Abundance surveys are problematic not only because this species is difficult to distinguish from the fin whale but more significant is that too little is known of the sei whale's distribution, population structure and patterns of movement; thus survey design and data interpretation are very difficult.

General human impacts and entanglement

Few instances of injury or mortality of sei whales due to entanglement or vessel strikes have been recorded in U.S. waters. Entanglement is not known to impact this species in the U.S. Atlantic, possibly because sei whales typically inhabit waters further offshore than most commercial fishing operations, or perhaps entanglements do occur but are less likely to be observed. A small number of ship strikes of this species have been recorded. The most recent documented incident occurred in 1994 when a carcass was brought in on the bow of a container ship in Charlestown, Massachusetts. Other impacts noted above for other baleen whales may also occur. Due to the deep-water distribution of this species, interactions that do occur are less likely to be observed or reported than those involving right, humpback, and fin whales that often frequent areas within the continental shelf.

5. Blue Whale (*Balaenoptera musculus*) - Like the fin whale, blue whales occur worldwide and are believed to follow a similar migration pattern from northern summering grounds to more southern wintering areas (Perry et al., 1999). Three subspecies have been identified; *Balaenoptera musculus musculus, B.m. intermedia*, and *B.m. brevicauda* (NMFS. 1998c). Only *B. musculus* occurs in the northern hemisphere. Blue whales range in the North Atlantic extends from the subtropics to Baffin Bay and the Greenland Sea (Aecium and Leatherwood, 1985). The IWC currently recognizes these whales as one stock (Perry et al., 1999).

Blue whales were intensively hunted in all of the world's oceans from the turn of the century to the mid-1960's (NMFS. 1998c). Blue whales were occasionally hunted by sailing vessel whalers in the 19^{th} century. However, development of steam-powered vessels and deck-mounted harpoon guns in the late 19^{th} century made it possible to exploit them on an industrial scale (NMFS. 1998c). Blue whale populations declined worldwide as the new technology spread and began to receive widespread use (Perry et al., 1999). Subsequently, the whaling industry shifted effort away from declining blue whale stocks and targeted other large species, such as fin whales, and then resumed hunting for blue whales when the species appeared to be more abundant (Perry et al., 1999). The result was a cyclical rise and fall, leading to severe depletion of blue whale stocks worldwide (Perry et al., 1999). In the North Atlantic, Norway shifted operations to fin whales as early as 1882 due to the scarcity of blue whales (Perry et al., 1999). In all, at least 11,000 blue whales were taken in the North Atlantic from the late 19^{th} century through the mid-20^{th} century. Blue whales were given complete protection in the North Atlantic in 1955 under the International Convention for the Regulation of Whaling. However, Iceland continued to hunt blue whales until 1960. There are no good estimates of the pre-exploitation size of the western North Atlantic blue whale stock but it is widely believed that this stock was severely depleted by the time legal protection was introduced in 1955 (Perry et al., 1999). Mitchell (1974) suggested that the stock numbered in the very low hundreds during the late 1960's through early 1970's (Perry et al., 1999). Photo-identification studies of blue whales in the Gulf of St. Lawrence from 1979 to 1995 identified 320 individual whales (NMFS. 1998c). The NMFS recognizes a minimum population estimate of 308 blue whales for the western North Atlantic (Waring et al. 1999).

Blue whales are only occasional visitors to east coast U.S. waters. They are more commonly found in Canadian waters, particularly the Gulf of St. Lawrence where they are present for most of the year, and other areas of the North Atlantic. It is assumed that blue whale distribution is governed largely by food requirements (NMFS. 1998c). In the Gulf of St. Lawrence, blue whales appear to predominantly feed on *Thysanoessa raschii* and *Meganytiphanes norvegica*. In the eastern North Atlantic, *T. inermis* and *M. norvegica* appear to be the predominant prey (NMFS. 1998c).

Compared to the other species of large whales, relatively little is known about this species. Sexual maturity is believed to occur in both sexes at 5-15 years of age. Gestation lasts 10-12 months and calves nurse for 6-7 months. The average calving interval is estimated to be 2-3 years. Birth and mating both take place in the winter season (NMFS. 1998c), but the location of wintering areas is speculative (Perry et al., 1999). In 1992 the U.S. Navy and contractors conducted an extensive blue whale acoustic survey of the North Atlantic and found concentrations of blue whales on the Grand Banks and west of the British Isles. One whale was tracked for 43 days during which time it traveled 1,400 nautical miles around the general area of Bermuda (Perry et al., 1999).

There is limited information on the factors affecting natural mortality of blue whales in the North Atlantic. Ice entrapment is known to kill and seriously injure some blue whales, particularly along the southwest coast of Newfoundland, during late winter and early spring. Habitat degradation has been suggested as possibly affecting blue whales such as in the St. Lawrence River and the Gulf of St. Lawrence where habitat has been degraded by acoustic and chemical pollution. However, there is no data to confirm that blue whales have been affected by such habitat changes (Perry et al., 1999).

General human impacts and entanglement
Entanglement in fishing gear and ship strikes are believed to be the major sources of anthropogenic mortality and injury of blue whales. However, confirmed deaths or serious injuries from either are few. In 1987, concurrent with an unusual influx of blue whales into the Gulf of Maine, one report was received from a whale watch boat that spotted a blue whale in the southern Gulf of Maine entangled in gear described as probable lobster pot gear. A second animal found in the Gulf of St. Lawrence apparently died from the effects of an entanglement. In March 1998, a juvenile male blue whale was carried into Rhode Island waters on the bow of a tanker. The cause of death was determined to be due to a ship strike, although not necessarily caused by the tanker on which it was observed, and the strike may have occurred outside the U.S. EEZ (Waring et al., 1999). No recent entanglements of blue whales have been reported from the U.S. Atlantic. Other impacts noted above for other baleen whales may occur.

6. Sperm Whale (*Physeter macrocephalus*) **-** Sperm whales inhabit all ocean basins, from equatorial waters to the polar regions (Perry et al., 1999). In the western North Atlantic they range from Greenland to the Gulf of Mexico and the Caribbean. The sperm whales that occur in the western North Atlantic are believed to represent only a portion of the total stock (Blaylock et al., 1995). Total numbers of sperm whales off the USA or Canadian Atlantic coast are unknown, although eight estimates from selected regions of the habitat do exist for select time periods. The best estimate of abundance for the North Atlantic stock of sperm whales is 4,702 (CV=0.36) (Waring et al., 2000). The minimum population estimate for the western North Atlantic sperm whale is 3,505 (CV=0.36). Sperm whales present in the Gulf of Mexico are considered by some researchers to be endemic, and represent a separate stock from whales in other portions of the North Atlantic. However, NMFS currently uses the IWC stock structure guidance which recognizes one stock for the entire North Atlantic (Waring et al., 1999).

The International Whaling Commission estimates that nearly a quarter-million sperm whales were killed worldwide in whaling activities between 1800 and 1900 (IWC 1971). However, estimates of the number of sperm whales taken during this time are difficult to quantify since sperm whale catches from the early 19^{th} century through the early 20^{th} century were calculated on barrels of oil produced per whale rather than the actual number of whales caught (Perry et al., 1999). With the advent of modern whaling the larger rorqual whales were targeted. However as their numbers decreased, greater attention was paid to smaller rorquals and sperm whales. From 1910 to 1982 there were nearly 700,000 sperm whales killed worldwide from whaling activities (Clarke 1954; Committee for Whaling Statistics 1959 -1983). Whale catches for the southern hemisphere is 394,000 (including revised Soviet figures). Sperm whales were hunted in America from the 17th century through the early 20^{th}

century.   In the North Atlantic, hunting occurred off of Iceland, Norway, the Faroe Islands, coastal Britain, West Greenland, Nova Scotia, Newfoundland/Labrador, New England, the Azores, Madeira, Spain, and Spanish Morocco (Waring et al., 1998). Some whales were also taken off the U.S. Mid-Atlantic coast (Reeves and Mitchell, 1988; Perry et al., 1999), and in the northern Gulf of Mexico (Perry et al., 1999). There are no catch estimates available for the number of sperm whales caught during U.S. operations (Perry et al., 1999). Recorded North Atlantic sperm whale catch numbers for Canada and Norway from 1904 to 1972 total 1,995. All killing of sperm whales was banned by the IWC in 1988. However, at the 2000 meetings of the IWC, Japan indicated it would include the take of sperm whales in its scientific research whaling operations. Although this action was disapproved of by the IWC, Japan has reported the take of 5 sperm whales from the North Pacific as a result of this research.

Sperm whales generally occur in waters greater than 180 meters in depth. While they may be encountered almost anywhere on the high seas, their distribution shows a preference for continental margins, sea mounts, and areas of upwelling, where food is abundant (Leatherwood and Reeves 1983). Sperm whales in both hemispheres migrate to higher latitudes in the summer for feeding and return to lower latitude waters in the winter where mating and calving occur. Mature males typically range to much higher latitudes than mature females and immature animals but return to the lower latitudes in the winter to breed (Perry et al., 1999). Waring et al. (1993) suggest sperm whale distribution is closely correlated with the Gulf Stream edge. Like swordfish, which feed on similar prey, sperm whales migrate to higher latitudes during summer months, when they are concentrated east and northeast of Cape Hatteras. In the U.S. EEZ, sperm whales occur on the continental shelf edge, over the continental slope, and into the mid-ocean regions (Waring et al., 1993), and are distributed in a distinct seasonal cycle; concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the mid-Atlantic Bight (Waring et al., 1999).

Sperm whale distribution may be linked to their social structure as well as distribution of their prey (Waring et al., 1999). Sperm whale populations are organized into two types of groupings: breeding schools and bachelor schools. Older males are often solitary (Best 1979). Breeding schools consist of females of all ages, calves and juvenile males. In the Northern Hemisphere, mature females ovulate April through August. During this season one or more large mature bulls temporarily join each breeding school. A single calf is born after a 15-month gestation. A mature female will produce a calf every 4-6 years. Females attain sexual maturity at a mean age of nine years, while males have a prolonged puberty and attain sexual maturity at about age 20 (Waring et al., 1999). Bachelor schools consist of maturing males who leave the breeding school and aggregate in loose groups of about 40 animals. As the males grow older they separate from the bachelor schools and remain solitary most of the year (Best 1979). Male sperm whales may not reach physical maturity until they are 45 years old (Waring et al., 1999). The sperm whales prey consists of larger mesopelagic squid (e.g., *Architeuthis* and *Moroteuthis*) and fish species (Perry et al., 1999). Sperm whales, especially mature males in higher latitude waters, have been observed to take significant quantities of large demersal and mesopelagic sharks, skates, and bony fishes (Clarke 1962, 1980).

The total number of sperm whales in the U.S. EEZ are unknown. For management purposes, NMFS uses 2,698 (CV=0.67) as the best estimate of abundance for the western North Atlantic sperm whale. This figure is based on a 1996 survey from Virginia to the Gulf of St. Lawrence (Waring et al., 1999). For purposes of determining the Potential Biological Removal (PBR[2]) under the MMPA, a minimum population estimate of 1,617 was used. Using this minimum estimate, PBR for the western North Atlantic sperm whale was calculated to be 3.2 animals (Waring et al., 1999). There is no Recovery Plan for this species.

General human impacts and entanglement
Few instances of injury or mortality of sperm whales due to human impacts have been recorded in U.S. waters. Because of their generally more offshore distribution and their benthic feeding habits, sperm whales are less subject to entanglement than are right or humpback whales.

Documented takes primarily involve offshore fisheries such as the offshore lobster pot fishery and pelagic driftnet and pelagic longline fisheries. The NMFS Sea Sampling program recorded three entanglements (in 1989, 1990, and 1995) of sperm whales in the swordfish drift gillnet fishery prior to permanent closure of the fishery in January 1999. All three animals were injured, found alive, and released. However, at least one was still carrying gear. Opportunistic reports of sperm whale entanglements for the years 1993-1997 include three records involving offshore lobster pot gear, heavy monofilament line, and fine mesh gillnet from an unknown source. Sperm whales may also interact opportunistically with fishing gear. Observers aboard Alaska sablefish and Pacific halibut longline vessels have documented sperm whales feeding on longline caught fish in the Gulf of Alaska (Perry et al., 1999). Behavior similar to that observed in the Alaskan longline fishery has also been documented during longline operations off South America where sperm whales have become entangled in longline gear, have been observed feeding on fish caught in the gear, and have been reported following longline vessels for days (Perry et al., 1999).

Sperm whales are also struck by ships. In May 1994 a ship struck sperm whale was observed south of Nova Scotia (Waring et al., 1999). A sperm whale was also seriously injured as a result of a ship strike in May 2000 in the western Atlantic. Due to the offshore distribution of this species, interactions that do occur are less likely to be reported than those involving right, humpback, and fin whales that more often occur in nearshore areas. Other impacts noted above for baleen whales may also occur.

Due to their offshore distribution, sperm whales tend to strand less often than, for example, right whales and humpbacks. Preliminary data for 2000 indicate that of ten sperm whales reported to the stranding network (nine dead and one injured) there was one possible fishery interaction, one ship strike (wounded with bleeding gash on side) and eight animals for which no signs of entanglement or injury

[2] The PBR is specified as the product of minimum populations size, one-half the maximum net productivity rate and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to Optimum Sustainable Population (MMPA Sec. 3. 16 U.S.C. 1362).

were sighted or reported. No sperm whales have stranded or been reported to the stranding network as of February 2001.

B. Status of Sea Turtles

1) Loggerhead Sea Turtle *(Caretta caretta*) - Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans in a wide range of habitats. These include open ocean, continental shelves, bays, lagoons, and estuaries (NMFS and USFWS, 1995). It is the most abundant species of sea turtle in U.S. waters, commonly occurring throughout the inner continental shelf from Florida through Cape Cod, Massachusetts. Loggerheads may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable (NEFSC survey data 1999). The loggerhead sea turtle was listed as threatened under the ESA on July 28, 1978, but is considered endangered by the World Conservation Union (IUCN).

Loggerhead sea turtles are generally grouped by their nesting locations. Nesting is concentrated in the north and south temperate zones and subtropics. Loggerheads generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (NRC 1990). The largest known nesting aggregations of loggerhead sea turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). However, the status of the Oman nesting beaches has not been evaluated recently, and their location in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills) is cause for considerable concern (Meylan et al. 1995). The southeastern U.S. nesting aggregation is the second largest and represents about 35 percent of the nests of this species. From a global perspective, this U.S. nesting aggregations is, therefore, critical to the survival of this species.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. In 1996, the Turtle Expert Working Group (TEWG) met on several occasions and produced a report assessing the status of the loggerhead sea turtle population in the western North Atlantic. Based on analysis of mitochondrial DNA, which the turtle inherits from its mother, the TEWG theorized that nesting assemblages represent distinct genetic entities, and that there are at least four loggerhead subpopulations in the western North Atlantic separated at the nesting beach (TEWG 1998). The TEWG (2000) identified the nesting subpopulations as: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29º N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29º N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); and (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990; approximately 1,000 nests in 1998). Natal homing to the nesting beach is believed to provide the genetic barrier between these nesting aggregations, preventing recolonization from turtles from other nesting beaches. In addition, recent fine-scale analysis of mtDNA work from Florida rookeries indicate that population separations begin to appear between nesting beaches separated by more than 50-100 km of coastline that does not host nesting (Francisco et al. 2000) and tagging studies are consistent with this result (Richardson 1982, Ehrhart 1979, LeBuff 1990, CMTTP: in NMFS

SEFSC 2001). Nest site relocations greater than 100 km occur, but are rare (Ehrhart 1979; LeBuff 1974, 1990; CMTTP; Bjorndal *et at*. 1983: *in* NMFS SEFSC 2001).

Although NMFS has not formally recognized subpopulations of loggerhead sea turtles under the ESA, based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG, 1998; TEWG 2000), NMFS treats the loggerhead turtle nesting aggregations as nesting subpopulations whose survival and recovery is critical to the survival and recovery of the species. Any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will treat the four nesting aggregations of loggerhead sea turtles as subpopulations (which occur in the action area) for the purposes of this analysis.

The loggerhead sea turtles in the action area of this consultation likely represent turtles that have hatched from any of the four western Atlantic nesting sites, but are probably composed primarily of turtles that hatched from the northern nesting group and the south Florida nesting group. Although genetic studies of benthic immature loggerheads on the foraging grounds have shown the foraging areas to be comprised of a mix of individuals from different nesting areas, there appears to be a preponderance of individuals from a particular nesting area in some foraging locations. For example, although the northern nesting group (North Carolina to northeast Florida) produces only about 9 percent of the loggerhead nests, loggerheads from this nesting area comprise between 25 and 59 percent of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia (NMFS SEFSC 2001; Bass et al., 1998; Norrgard, 1995; Rankin-Baransky, 1997; Sears 1994, Sears et al., 1995). Loggerheads that forage from Chesapeake Bay southward to Georgia are nearly equally divided in origin between south Florida and the northern nesting group (TEWG, 1998). In the Carolinas, the northern subpopulation is estimated to make up from 25 to 28 percent of the loggerheads (NMFS SEFSC 2001; Bass *et al.* 1998, 1999). About 10 percent of the loggerhead sea turtles in foraging areas off the Atlantic coast of central Florida are from the northern subpopulation (Witzell et al., in prep). In the Gulf of Mexico, most of the loggerhead sea turtles in foraging areas will be from the South Florida subpopulation, although the northern subpopulation may represent about 10 percent of the loggerhead sea turtles in the Gulf (Bass, pers. comm.).

Similar mixing trends have been found for loggerheads in pelagic waters. In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads can be traced to the South Florida subpopulation and about 2 percent are from the northern subpopulation, while only about 51 percent originated from Mediterranean nesting beaches (Laurent et al., 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19 percent of the pelagic loggerheads are from the northern subpopulation, about 71 percent are from the South Florida subpopulation, and about 11 percent are from the Yucatán subpopulation (Bolten et al., 1998).

Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments. Turtles in this life history stage are called "pelagic immatures" and are best known from the eastern Atlantic near the Azores and Madeira and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal et al., in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length (SCL) they move to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico. However, recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, followed by permanent settlement into benthic environments. Some may not totally circumnavigate the north Atlantic before moving to benthic habitats, while others may either remain in the pelagic habitat longer than hypothesized or move back and forth between pelagic and coastal habitats (Witzell in prep.).

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder et al., 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals are actually more abundant in these areas or just more abundant within the area relative to the smaller turtles. Given an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; Frazer and Limpus 1998), the benthic immature stage must be at least 10-25 years long. Adult loggerhead sea turtles have been reported throughout the range of this species in the U.S. and throughout the Caribbean Sea. As discussed in the beginning of this section, they nest primarily from North Carolina southward to Florida with additional nesting assemblages in the Florida Panhandle and on the Yucatán Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. NMFS SEFSC 2001 analyses conclude that juvenile stages have the highest elasticity and maintaining or decreasing current sources of mortality in those stages will have the greatest impact on maintaining or increasing population growth rates.

Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998). Like other sea turtles, the movements of loggerheads are influenced by water temperature. Since they are limited by water temperatures, loggerhead sea turtles do not usually appear on the northern summer foraging grounds (e.g., Cape Cod Bay) until June, but are found in Virginia as early as April. The large majority leave the Gulf of Maine by mid-September but may remain until as late as November or December (Epperly et al., 1995; Keinath 1993; Morreale and Standora 1999; Shoop and Kenney 1992). Loggerhead sea turtles are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (Wynne and Schwartz, 1999). Under certain conditions they may also scavenge fish, particularly if they are easy to catch (e.g., caught in nets; NMFS and USFWS, 1991).

The four major subpopulations of loggerhead sea turtles in the northwest Atlantic — northern, south Florida, Florida panhandle, and Yucatán — are all subject to fluctuations in the number of young produced annually because of human-related activities as well as natural phenomena. Loggerhead sea turtles face numerous threats from natural causes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November), and the loggerhead sea turtle nesting season (March to November). Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida; all of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane (Milton et al., 1992). On Fisher Island near Miami, Florida, 69 percent of the eggs did not hatch after Hurricane Andrew, probably because they were drowned by the storm surge. Nests from the northern nesting group were destroyed by hurricanes which made landfall in North Carolina in the mid to late 1990's. Other sources of natural mortality include cold stunning and biotoxin exposure.

General Human-related Impacts

The diversity of the sea turtle's life history leaves them susceptible to many human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. On their nesting beaches in the U.S., adult female loggerheads as well as hatchlings are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; predation by species such as exotic fire ants, raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), opossums (*Didelphus virginiana*); and poaching. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. For example, Volusia County, Florida, allows motor vehicles to drive on sea turtle nesting beaches (the County has filed suit against the U.S. Fish and Wildlife Service to retain this right). Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are impacted by a completely different set of threats from human activity once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these four subpopulations circumnavigate the North Atlantic over several years (Carr 1987, Bjorndal 1994). During that period, they are exposed to a series of long-line fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar et al., 1995, Bolten et al., 1994, Crouse 1999). Observer records indicate that an estimated 6,544 loggerheads were captured by the U.S. Atlantic tuna and swordfish longline fleet between 1992-1998, of which an estimated 43 were dead (Yeung et al. in prep.). Logbooks and observer records indicated that loggerheads readily ingest hooks (Witzell 1999). For 1998, alone, an estimated 510 loggerheads (225-1250) were captured in the longline fishery. Aguilar et al. (1995) reported that hooks were removed from only 171 of 1,098 loggerheads captured in the Spanish longline fishery, describing that removal was possible only when the hook was found in the mouth, the tongue or, in a few cases, externally (flippers, etc.); the presumption is that all others had ingested the hook. Aguilar et al. (1995) estimated that the Spanish swordfish longline fleet, which is only one of the many fleets operating in the region, captures more than 20,000 juvenile loggerheads annually (killing as many as 10,700).

In waters off the coastal U.S., loggerhead sea turtles are exposed to a suite of fisheries in Federal and State waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries. Loggerhead sea turtles are captured in fixed pound net gear in the Long Island Sound, in pound net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, in gillnet fisheries in the mid-Atlantic and elsewhere, and in monkfish, spiny dogfish, and northeast sink gillnet fisheries (see further discussion in the Environmental Baseline of this Opinion). The take of sea turtles, including loggerheads, in shrimp fisheries off the Atlantic coast have been well documented. It has previously been observed that loggerhead turtle populations along the southeastern Atlantic coast declined where shrimp fishing was intense off the nesting beaches but, conversely, did not appear to be declining where nearshore shrimping effort was low or absent (NRC 1990).

In addition to fishery interactions, loggerhead sea turtles also face other threats in the marine environment, including the following: oil and gas exploration, development, and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching.

Status and Trend of Loggerhead Sea Turtles

Based on the data available, it is difficult to estimate the size of the loggerhead sea turtle population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead sea turtles. However, an important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females, but it may not reflect overall population growth rates. Given this, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually, with a mean of 73,751. Since a female often lays multiple nests in any one season, the average adult female population of 44,780 was calculated using the equation [(nests/4.1) * 2.5]. This data provide an annual estimate of the number of nests laid per year while indirectly estimating both the number of females nesting in a particular year (based on an average of 4.1 nests per nesting female, Murphy and Hopkins (1984)) and of the number of adult females in the entire population (based on an average remigration interval of 2.5 years; Richardson *et al.*, 1978)). On average, 90.7% of these nests were of the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation the turtles making these nests belong. Based on the above, there are only an estimated approximately 3,800 nesting females in the northern loggerhead subpopulation. The status of this northern population based on number of loggerhead nests, has been classified as stable or declining (TEWG 2000). Another consideration adding to the vulnerability of the northern subpopulation is that NMFS scientists estimate, using genetics data from Texas, South Carolina, and North Carolina in combination with juvenile sex ratios from those states, that the northern subpopulation produces 65% males, while the south Florida subpopulation is estimated to produce 80% females (NMFS SEFSC 2001, Part I).

Several published reports have presented the problems facing long-lived species that delay sexual maturity (Congdon et al., 1993, Congdon and Dunham 1994, Crouse et al., 1987, Crowder et al., 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high, annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general rule applies to sea turtles, particularly loggerhead sea turtles, because the rule originated in studies of sea turtles (Crouse et al., 1987, Crowder et al., 1994, Crouse 1999). Heppell et al. (in prep.) specifically showed that the growth of the loggerhead sea turtle population was particularly sensitive to changes in the annual survival of both juvenile and adult sea turtles and that the adverse effects of the pelagic longline fishery on loggerheads from the pelagic immature phase appeared critical to the survival and recovery of the species. Crouse (1999) concluded that relatively small decreases in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population. The survival of hatchlings seems to have the least amount of influence on the survivorship of the species, but historically, the focus of sea turtle conservation has been involved with protecting the nesting beaches. While nesting beach protection and hatchling survival are important, recovery efforts and limited resources might be more effective by focusing on the protection of juvenile and adult sea turtles.

2. Leatherback Sea Turtle (*Dermochelys coriacea*) **-** Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). The leatherback sea turtle is the largest living turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS, 1995). Evidence from tag returns and strandings in the western Atlantic suggests that adults engage in routine migrations between boreal, temperate and tropical waters (NMFS and USFWS, 1992). In the U.S., leatherback turtles are found throughout the action area of this consultation. Located in the northeastern waters during the warmer months, this species is found in coastal waters of the continental shelf and near the Gulf Stream edge, but rarely in the inshore areas (Lutcavage 1996). However, leatherbacks may migrate close to shore, as a leatherback was satellite tracked along the mid-Atlantic coast, thought to be foraging in these waters (Eckert pers.comm.). A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Shoop and Kenney (1992) also observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. Leatherbacks in these waters are thought to be following their preferred jellyfish prey. This aerial survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina).

Compared to the current knowledge regarding loggerhead populations, the genetic distinctness of leatherback populations is less clear. However, genetic analyses of leatherbacks to date indicate female turtles nesting in St. Croix/Puerto Rico and those nesting in Trinidad differ from each other and from turtles nesting in Florida, French Guiana/Suriname and along the South African Indian Ocean coast. Much of the genetic diversity is contained in the relatively small insular subpopulations. Although populations or subpopulations of leatherback sea turtles have not been formally recognized, based on the most recent reviews of the analysis of population trends of leatherback sea turtles, and due to our limited understanding of the genetic structure of the entire species, the most conservative approach would be to treat leatherback nesting populations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood for one or more of these nesting populations to survive and recover in the wild, would appreciably reduce the species' likelihood of survival and recovery in the wild.

Leatherbacks are predominantly a pelagic species and feed on jellyfish (i.e., *Stomolophus*, *Chryaora*, and *Aurelia* (Rebel 1974)), cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas). Time-Depth-Recorder data recorded by Eckert et al. (1998) indicate that leatherbacks are night feeders and are deep divers, with recorded dives to depths in excess of 1000 m. However, leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas associated with a dense aggregation of Stomolophus. Leatherbacks also occur annually in places such as Cape Cod and Narragansett Bays during certain times of the year, particularly the fall.

Although leatherbacks are a long lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported as about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NMFS SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). The eggs will incubate for 55-75 days before hatching. The habitat requirements for post-hatchling leatherbacks are virtually unknown (NMFS and USFWS, 1992).

General human impacts and entanglement

Anthropogenic impacts to the leatherback population are similar to those discussed above for the loggerhead sea turtle, including fishery interactions as well as intense exploitation of the eggs (Ross, 1979). Eckert (1996) and Spotila et al. (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. Zug and Parham (1996) attribute the sharp decline in leatherback populations to the combination of the loss of long-lived adults in fishery related mortality, and the lack of recruitment stemming from elimination of annual influxes of hatchlings because of intense egg harvesting.

Poaching is not known to be a problem for U.S. nesting populations. However, numerous fisheries that occur in both U.S. state and federal waters are known to negatively impact juvenile and adult leatherback sea turtles. These include incidental take in several commercial and recreational fisheries. Fisheries known or suspected to incidentally capture leatherbacks include those deploying bottom trawls, off-bottom trawls, purse seines, bottom longlines, hook and line, gill nets, drift nets, traps, haul seines, pound nets, beach seines, and surface longlines (NMFS and USFWS 1992). At a workshop held in the Northeast in 1998 to develop a management plan for leatherbacks, experts expressed the opinion that incidental takes in fisheries were likely higher than is being reported.

Leatherback interactions with the southeast shrimp fishery are also common. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. Therefore, the NMFS has used several alternative measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25260). NMFS established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. It allows the NMFS to quickly close the area or portions of the area to the shrimp fleet on a short-term basis when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates. Other emergency measures may also be used to minimize the interactions between leatherbacks and the shrimp fishery. For example, in November 1999 parts of Florida experienced an unusually high number of leatherback strandings. In response, the NMFS required shrimp vessels operating in a specified area to use TEDs with a larger opening for a 30-day period beginning December 8, 1999 (64 FR 69416) so that leatherback sea turtles could escape if caught in the gear.

Leatherbacks are also susceptible to entanglement in lobster and crab pot gear, possibly as a result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, attraction to the buoys which could appear as prey, or the gear configuration which may be more likely to wrap around flippers. The total number of leatherbacks reported entangled from New York through Maine from all sources for the years 1980 - 2000 is 119; out of this total, 92 of these records took place from 1990-2000 (NMFS 2001, Lobster BO) Entanglements are also common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line and crab pot line. It is unclear how leatherbacks become entangled in such gear. Prescott (1988) reviewed stranding data for Cape Cod Bay and concluded that for those turtles where cause of death could be determined (the minority), entanglement in fishing gear is the leading cause of death followed by capture by dragger, cold stunning, or collision with boats.

Spotila et al. (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species' natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e. egg, hatchling, and juvenile) remained static. Model simulations indicated that an increase in adult mortality of more than 1% above background levels in a stable population was unsustainable. As noted, there are many human-related sources of mortality to leatherbacks; a tally of all leatherback takes anticipated annually under current biological opinions completed for the NMFS June 30, 2000, biological opinion on the pelagic longline fishery projected a potential for up to 801 leatherback takes, although this sum includes many takes expected to be nonlethal. Leatherbacks have a number of pressures on their populations, including injury or mortality in fisheries, other federal activities (e.g. military activities, oil and gas development, etc.), degradation of nesting habitats, direct harvest of eggs, juvenile and adult turtles, the effects of ocean pollutants and debris, lethal collisions, and natural disturbances such as hurricanes (which may wipe out nesting beaches). Spotila et al.

(1996) recommended not only reducing mortalities resulting from fishery interactions, but also advocated protection of eggs during the incubation period and of hatchlings during their first day, and indicated that such practices could potentially double the chance for survival and help counteract population effects resulting from adult mortality. They conclude, "stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing...the Atlantic population is the most robust, but it is being exploited at a rate that cannot be sustained and if this rate of mortality continues, these populations will also decline. "

Status and Trends of Leatherback Sea Turtles

Estimated to number approximately 115,000 adult females globally in 1980 (Pritchard 1982) and only 34,500 by 1995 (Spotila *et al.* 1996), leatherback populations have been decimated worldwide, not only by fishery related mortality but, at least historically, primarily due to intense exploitation of the eggs (Ross 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert 1996). Eckert (1996) and Spotila *et al.* (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. Spotila (2000) states that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls and gillnets) in the Pacific during the 1990s is 1,500 animals. He estimates that this represented about a 23% mortality rate (or 33% if most mortality was focused on the East Pacific population).

The Pacific population appears to be in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila et al., 2000). The East Pacific leatherback population was estimated to be over 91,000 adults in 1980 (Spotila et al., 1996). Declines in nest abundance have been reported from primary nesting beaches. At Mexiquillo, Michoacan, Mexico, Sarti et al. (1996) reported an average annual decline in nesting of about 23% between 1984 and 1996. The total number of females nesting on the Pacific coast of Mexico during the 1995-1996 season was estimated at fewer than 1,000. Less than 700 females are estimated for Central America (Spotila 2000). At the Playa Grande, Costa Rica, nesting beach, only 11.9% of turtles tagged in 1993-94 and 19.0% of turtles tagged in 1994-95 returned to nest over the next five years. Spotila (2000) asserts that most of the mortality associated with the Playa Grande nesting site was fishery related. In the western Pacific, the decline is equally severe. Current nestings at Terengganu, Malaysia represent 1% of the levels recorded in the 1950s (Chan and Liew 1996). Characterizations of this Pacific population suggest that is has a very low likelihood of survival and recovery in the wild under current conditions.

Nest counts are currently the only reliable indicator of population status available for leatherback turtles. The status of the leatherback population in the Atlantic is difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. Recent information suggests that Western Atlantic populations declined from 18,800 nesting females in 1996 (Spotila et al., 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm). Eastern Atlantic (i.e. off Africa, numbering ~ 4,700) and Caribbean (4,000) populations appear to be stable, but there is conflicting information (Spotila, pers. comm) for some sites and it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands) have been extirpated (NMFS and USFWS 1995). In addition, researchers are currently unable to explain the underlying mechanisms which somehow are resulting simultaneously in high mortality levels to nesting age females at the nesting beach at Sandy Point, St.

Croix, and yet exponential growth in the nesting population (increasing at 8.1 % per year based on data since 1979 (r=0.130, S.E.=0.014, NMFS SEFSC 2001). Marked leatherback returns to the nesting beach at St. Croix averaged only 48.5% between 1989 and 1995, and based on an expected inter-nesting interval of one to five years, Dutton et al. (in press) estimate a 19 - 49% mortality rate for re-migrating females at Sandy Point (McDonald et al., 1993). Despite this, the overall nesting population grew. This nesting population has been subject to intensive conservation management efforts since 1981 but it is not known whether the observed increase is due to improved adult survival or recruitment of new nesters since flipper tag loss is so high in this species. Better data collection methods implemented since the late 1980s may soon help to answer these questions. Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (13% increase), though it should be noted that there was also an increase in the survey area in Florida over time (NMFS SEFSC 2001). Where data are available, population numbers are down in the Western Atlantic, but stable in the Caribbean and Eastern Atlantic. It does appear, however, that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females.

In the western Atlantic, the primary nesting beaches occur in French Guiana, Suriname, and Costa Rica. The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot, 1998). In a talk at the Annual Sea Turtle Symposium on March 2, 2000, entitled "Driftnet Fishing in the Marconi Estuary: the Major Reason for the Leatherback Turtle's Decline in the Guianas," Chevalier (pers. comm.) stated that leatherback nesting has declined since the mid-1970's (1987-1992 mean = 40,950 nests and 1993-1998 mean = 18,100 nests). These declines do not appear to be attributable to shifts in nesting from French Guiana and Suriname to other Caribbean sites (there has only been one tag recapture elsewhere), or to human-induced mortality on the beach in French Guiana. However, around 90% of the nests are laid within 25 km of the Marconi estuary. Strandings in the estuary in 1997, 1998, and 1999 were 70, 60, and 100, respectively, which Chevalier considers underestimates (pers. comm.). He questioned the fishermen and actually observed a 1 km (gill) net with seven dead leatherbacks. This observation, coupled with the strandings, led him to conclude that large numbers of leatherbacks are incidentally captured in large mesh nets. Although there are protected areas nearshore in French Guiana, driftnets are set offshore. In Suriname there are no such protected areas and fishing occurs at the beach. In addition, offshore nets soak overnight in Suriname and many boats fish overnight. This could present a greater problem for leatherbacks which are believed to be night feeders. According to Chevalier, to address these problems the French Guiana government is starting up a working group to deal with accidental capture of leatherbacks and to enforce the legislation. They plan to study the accidental capture by the fishermen, satellite track turtles, study strandings, and work towards the management of the fishery activity through collaborations with Suriname.

Poaching of nests likely has contributed to the decline of leatherback populations. Swinkels (pers. comm.) presentation at the Annual Sea Turtle Symposium on March 3, 2000, entitled "The Leatherback on the Move? Promising News from Suriname" included information that there was a large increase in leatherback nesting in Suriname from 1995- 1999. However, these increases appear to be accompanied by increasing poaching of nests. Samsambo is a very dynamic newly created (by natural events) nesting beach. In 1995, very little poaching effort was concentrated there because there was not much beach or nesting at the time. Since that time, however, the beach has naturally been renourished and poaching has been increasing. In 1999, there were >4000 nests of which about 50% were poached. Overall, increasing trends in leatherback nesting were observed on three Suriname beaches but poaching was 80 percent.

3. Kemp's Ridley Sea Turtle *(Lepidochelys kempii)* - The Kemp's ridley is the most endangered of the world's sea turtle species. Of the world's seven extant species of sea turtles, the Kemp's ridley has declined to the lowest population level. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nest in this single locality (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and there is cautious optimism that the population is now increasing.

Kemp's ridley nesting occurs from April through July each year. Little is known about mating but it is believed to occur at or before the nesting season in the vicinity of the nesting beach. Hatchlings emerge after 45-58 days. Once they leave the beach, neonates presumably enter the Gulf of Mexico where they feed on available sargassum and associated infauna or other epipelagic species (USFWS and NMFS, 1992). Research conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine Pass and the entrance to Galveston Bay. Between 1989 and 1993, 50 of the Kemp's ridleys captured were tracked (using satellite and radio telemetry) by biologists with the NMFS Galveston Laboratory. The tracking study was designed to characterize sea turtle habitat and to identify small and large scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NMFS Galveston Laboratory, pers. comm.). Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. However, at least some juveniles will travel northward as water temperatures warm to feed in productive coastal waters of Georgia through New England (USFWS and NMFS, 1992).

Juvenile Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 centimeters in carapace length, and weighing less than 20 kilograms (Terwilliger and Musick 1995). Next to loggerheads, they are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al.*, 1987; Musick and Limpus, 1997). In the Chesapeake Bay, where the juvenile population of Kemp's ridley sea turtles is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick

1985; Bellmund *et al.*, 1987; Keinath *et al.*, 1987; Musick and Limpus 1997). Other studies have found that post-pelagic ridleys feed primarily on crabs, consuming a variety of species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal, 1997).

With the onset of winter and the decline of water temperatures, ridley's migrate to more southerly waters from September to November (Keinath *et al.,* 1987; Musick and Limpus, 1997). Turtles who do not head south soon enough face the risks of cold-stunning in northern waters. Cold stunning can be a significant natural cuase of mortality for sea turtles in Cape Cod Bay and Long Island Sound. For example, in the winter of 1999/2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (R. Prescott, pers. comm.). Annual cold stun events do not always occur at this magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Other cold-stunned turtles have been found on beaches in New York and New Jersey (Morreale et al., 1992). Although many cold-stun turtles can survive if found early enough, cold-stunning events can represent a significant cause of natural mortality.

General human impacts and entanglement

Like other turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940's through the early 1960's, nests from Ranch Nuevo were heavily exploited (USFWS and NMFS, 1992), but beach protection in 1966 helped to curtail this activity (USFWS and NMFS, 1992). Currently, anthropogenic impacts to the Kemp's ridley population are similar to those discussed above for other sea turtle species. Sea sampling coverage in the Northeast otter trawl fishery, pelagic longline fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles. Following World War II, there was a substantial increase in the number of trawl vessels, particularly shrimp trawlers, in the Gulf of Mexico where the adult Kemp's ridley turtles occur. Information from fishers helped to demonstrate the high number of turtles taken in these shrimp trawls (USFWS and NMFS, 1992). Subsequently, NMFS has worked with the industry to reduce turtle takes in shrimp trawls and other trawl fisheries, including the development and use of TEDs.

Kemp's ridleys may also be affected by large-mesh gillnet fisheries. In the spring of 2000, a total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all of the carcasses washed ashore. It is possible that strandings of Kemp's ridley turtles in some years have increased at rates higher than the rate of increase in the Kemp's ridley population (TEWG 1998).

Status and Trends of Kemp's Ridley Sea Turtles

The TEWG (1998; 2000) indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Nesting data, estimated number of adults, and percentage of first time nesters have all increased from lows experienced in the 1970's and 1980's. From 1985 to 1999, the number of nests observed at Rancho Nuevo and nearby beaches has increased at a mean rate of 11.3% per year, allowing cautious optimism that the population is on its way to recovery. For example, nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and 702 nests in 1985 then increased to produce 1,940 nests in 1995. Estimates of adult abundance followed a similar trend from an estimate of 9,600 in 1966 to 1,050 in 1985 and 3,000 in 1995. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994. The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the USFWS and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of TEDs. According to nests counted at Rancho Nuevo, North Camp and South Camp, Mexico, adult ridley numbers have now grown from a low of approximately 1,050 adults producing 702 nests in 1985, to greater than 3,000 adults producing 1,940 nests in 1995 and about 3,400 nests in 1999 (TEWG 2000).

The population model in the TEWG report projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. The TEWG (1998) identified an average Kemp's ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular internesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

One area for caution in the TEWG findings is that the area surveyed for ridley nests in Mexico was expanded in 1990 due to destruction of the primary nesting beach by Hurricane Gilbert. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. The TEWG (1998) assumed that the observed increases in nesting, particularly since 1990, was a true increase rather than the result of expanded beach coverage. As noted by TEWG, trends in Kemp's ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

4. Green Sea Turtle *(Chelonia mydas*) - Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz, 1999). Most green turtle nesting in the continental United States occurs on the Atlantic Coast of Florida (Ehrhart 1979). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species. In the Gulf of Mexico, green turtles were once abundant enough in the shallow bays and lagoons to support a commercial fishery. In 1890, over one million pounds of green turtles were taken in the Gulf of Mexico green sea turtle fishery (Doughty 1984). However, declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan *et al.,* 1995). Certain Florida nesting beaches where most green turtle nesting activity occurs have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan *et al.,* 1995). Recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Recent population estimates for the western Atlantic area are not available.

While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). Green turtles appear to prefer marine grasses and algae in shallow bays, lagoons and reefs (Rebel 1974) but also consume jellyfish, salps, and sponges. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other

Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The preferred food sources in these areas are *Cymodocea, Thalassia, Zostera, Sagittaria,* and *Vallisneria* (Babcock 1937, Underwood 1951, Carr 1952, 1954).

As is the case for loggerhead and Kemp's ridley sea turtles, green sea turtles use mid-Atlantic and northern areas of the western Atlantic coast as important summer developmental habitat. Green turtles are found in estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds (Musick and Limpus 1997). Like loggerheads and Kemp's ridleys, green sea turtles that use northern waters during the summer must return to warmer waters when water temperatures drop, or face the risk of cold stunning. Cold stunning of green turtles may occur in southern areas as well (*i.e*., Indian River, Florida), as these natural mortality events are dependent on water temperatures and not solely geographical location.

Fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body, has been found to infect green turtles, most commonly juveniles. The occurrence of fibropapilloma tumors, most frequently documented in Hawaiian green turtles, may result in impaired foraging, breathing, or swimming ability, leading potentially to death.

General human impacts and entanglement

Anthropogenic impacts to the green sea turtle population are similar to those discussed above for other sea turtles species. As with the other species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality. Sea sampling coverage in the pelagic driftnet, pelagic longline, scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. A preliminary sea sampling data summary (1994-1998) shows the following total take of green turtles: 1 (anchored gillnet), 2 (pelagic driftnet), and 2 (pelagic longline). Stranding reports indicate that between 200-400 green turtles strand annually along the Eastern U.S. coast from a variety of causes most of which are unknown (Sea Turtle Stranding and Salvage Network, unpublished data).

5. Hawksbill Sea Turtle *(Eretmochelys imbricata)* - The hawksbill turtle is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands.

There are accounts of hawksbills in south Florida and a surprising number are encountered in Texas. Most of the Texas records report small turtles, probably in the 1-2 year class range. Many captures or strandings are of individuals in an unhealthy or injured condition (Hildebrand 1982). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a viable population in this area. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). However, many of these strandings were observed after hurricanes or offshore storms. No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the NEFSC observer program. Hawksbills may occur in the southern range of the action area, but their distribution in the monkfish fishery area is infrequent.

IV. ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this Opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation generally fall into the following three categories: vessel operations, fisheries, and recovery activities associated with reducing those impacts. Other environmental impacts include the effects of dredging, disposal, ocean dumping, and sonic activity.

A. Federal actions that have undergone formal or early section 7 consultation

NMFS has undertaken several ESA section 7 consultations to address the effects of vessel operations and gear associated with federally-permitted fisheries on threatened and endangered species in the action area. Each of those consultations sought to develop methods to reduce the probability of adverse impacts of the action on large whales and sea turtles. Similarly, under both the MMPA and the ESA, NMFS is implementing measures to reduce the take of whales in the fishing and maritime industries.

1. Vessel-related Operations and Exercises - Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the USCG, which maintain the largest federal vessel fleets, the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineers (ACOE). NMFS has conducted formal consultations with the USCG, the USN (described below) and is currently in early phases of consultation with other federal agencies on their vessel operations (e.g., NOAA research vessels). In addition to operation of ACOE vessels, NMFS has consulted with the ACOE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. At the present time, however, there is the potential for some level of interaction. The Opinions for the USCG (September 15, 1995, July 22, 1996, and June 8, 1998) and the USN (May 15, 1997) provide further detail on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

Since the USN consultation only covered operations out of Mayport, Florida, NMFS has not yet examined the effects on listed species of USN vessels to adversely affect large whales and sea turtles when they are operating in other areas within the range of these species. Similarly, operations of vessels by other federal agencies within the action area (NOAA, EPA, ACOE) may adversely affect whales and sea turtles. However, the in-water activities of these agencies are limited in scope, as they operate a small number of vessels or are engaged in research/operational activities that are unlikely to contribute a large amount of risk. Through the consultation process, conservation recommendations will be provided to further reduce the potential for adverse impacts.

2. Additional military activities, including vessel operations and ordnance detonation, also may affect listed species of whales and sea turtles. USN aerial bombing training in the ocean off the southeast U.S. coast, involving drops of live ordnance (500 and 1,000-lb bombs) is estimated to have the potential to injure or kill, annually, 84 loggerheads, 12 leatherbacks, and 12 greens or Kemp's ridley, in combination (NMFS, 1997a). The USN also conducted ship-shock testing for the new SEAWOLF submarine off the Atlantic coast of Florida, using 5 submerged detonations of 10,000 lb explosive charges. This testing was estimated to have the potential to injure or kill 50 loggerheads, 6 leatherbacks, and 4 hawksbills, greens, or Kemp's ridleys, in combination (NMFS, 1996c). Operation of the USCG's boats and cutters in the U.S. Atlantic is estimated to take no more than one individual turtle—of any species—per year (NMFS, 1995). Formal consultation on USCG or USN activities in the Gulf of Mexico has not been conducted.

The construction and maintenance of Federal navigation channels by the U.S. Army Corps of Engineers has also been identified as a source of turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. Along the Atlantic coast of the southeastern United States, NMFS estimates that annual, observed injury or mortality of sea turtles from hopper dredging may reach 35 loggerheads, 7 greens, 7 Kemp's ridleys, and 2 hawksbills (NMFS, 1997b). Along the north and west coasts of the Gulf of Mexico, channel maintenance dredging using a hopper dredge may injure or kill 30 loggerhead, 8 green, 14 Kemp's ridley, and 2 hawksbill sea turtles annually (NMFS, 1997c).

3. Federal Fishery Operations - The most reliable method for monitoring fishery interactions is the sea sampling program, which provides random sampling of commercial fishing activities. The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989, and since that year several fisheries have been covered by the program. Additionally, in late 1992 and in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and currently provides observer coverage of pelagic longline vessels fishing off the same part of Grand Banks, and south of Cape Hatteras. However, due to the size, power, and mobility of whales, sea sampling is only effective for sea turtles and sturgeon. Although takes of whales are occasionally observed by the sea sampling program, levels of interaction between whales and fishing vessels and their gear is derived from data collected opportunistically. However, it is often difficult to assign gear found on stranded or free-swimming animals to a specific fishery. Other gear identified as gillnet or trawl gear could not be assigned to a particular gillnet or trawl fishery. Determining the location where an entanglement occurred is even more difficult. For example, the point of occurrence is only known for one of the eight right whale entanglement events (U.S. waters) that occurred in 1997. Additionally, most right whale mortalities are never observed, therefore the actual annual number of mortalities caused by entanglements in fishing gear cannot be determined. Consequently, documented cases of whale mortalities caused by fishing provide an underestimate of take, and the total level of interaction between fisheries and whales is unknown. However, there is sufficient information to identify several commercial fisheries that use gear that is known to take listed species. Interactions with either whales or sea turtles have been documented in Federally regulated gillnet, longline, trawl, seine, dredge, and pot fisheries.

Formal ESA section 7 consultation has been conducted on the following fisheries which may adversely affect threatened and endangered species: American Lobster, Monkfish, Atlantic Pelagic Swordfish/Tuna/Shark, Summer Flounder/Scup/Black Sea Bass, Atlantic Mackerel/Squid/Atlantic Butterfish, Atlantic Bluefish, and Northeast Multispecies fisheries. Three of these consultations, on the American Lobster, Monkfish, and Multispecies Fishery Management Plans, were conducted concurrently with this Biological Opinion.

All of these consultations are summarized below. More detailed information can be found in the respective Opinions.

The *American lobster pot fishery* is the largest fixed gear fishery in the action area. This fishery is known to take endangered whales and sea turtles. An Incidental Take Statement has been issued for sea turtle takes in this fishery.

Formal consultation on the lobster fishery under the Magnuson-Stevens Act (MSA) reached a jeopardy conclusion for the North Atlantic right whale with the Opinion issued December 13, 1996. As a result of the Reasonable and Prudent Alternative (RPA) included with the 1996 Opinion, an emergency regulation under the MMPA (Emergency Interim Final Rule, 62 FR 16108) was published that implemented restrictions on the use of lobster pot gear in the federal portion of the Cape Cod Bay right whale critical habitat and in the Great South Channel right whale critical habitat during periods of expected peak right whale abundance. NMFS reinitiated formal consultation on the federally regulated lobster fishery in 1998 to consider: (1) potential effects of the transfer of management authority from the MSA to the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA), (2) the implementation of new lobster management actions under the ACFCMA, and (3) recent takes of endangered whales in the fishery. The ACFCMA plan includes measures to limit the number of lobster traps that can be deployed during the first two years of the plan, and further trap reduction measures may be chosen as default effort reduction measures during subsequent plan years. Although there is no way of quantifying the anticipated benefit from reductions in gear, it is generally assumed that there will be fewer protected species-gear interactions if there is less gear in the water.

Serious injuries and mortalities of endangered whales have occured as a result of interactions with lobster trap gear, therefore the interaction between the lobster trap fishery and endangered whales are considered in the ALWTRP. The NMFS reinitated consultation on the lobster fishery on May 4, 2000, to reevaluate the ability of the reasonable and prudent alternative to avoid the likelihood of jeopardy to right whales from the lobster trap fishery. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures which affect operation of the lobster fishery. The Opinion concluded that the lobster trap fishery as modified by the RPA did not avoid the likelihood of jeopardy for northern right whales. A new RPA has been provided that is expected to remove the threat of jeopardy to northern right whales as a result of the continued implementation of the American Lobster FMP.

Amendment 3 to the American Lobster FMP contained the outline of a long-term plan with annual targets during the lobster rebuilding period and initial effort reduction measures for some areas. These effort reduction measures included limited entry and trap limits. All Federal lobster permit holders are subject to trap limits throughout the lobster management areas as of May 1, 2000; the start of the American lobster 2000 fishing year. These trap limits are expected to have an added benefit of generating some risk reduction for protected species.

The *monkfish fishery* uses several gear types that may entangle protected species. However, monkfish gillnet gear appears to pose the greatest risk of entanglement to both marine mammals and sea turtles. The monkfish gillnet sector is included in either the Northeast sink gillnet or mid-Atlantic coastal gillnet fisheries and is therefore regulated by both the ALWTRP and Harbor Porpoise Take Reduction Plan (HPTRP). NMFS completed a formal consultation on the Monkfish FMP on December 21, 1998, which concluded that the fishery, with modification under the take reduction plans, was not likely to jeopardize listed species or adversely modify critical habitat. However, serious injuries and at least one mortality of a right whale have occurred as a result of entanglements in gillnet gear since the 1998 Opinion. The gillnet gear entanglements may or may not be attributable to the monkfish gillnet fishery. In most cases, NMFS is unable to assign responsibility for a gillnet gear entanglement to a particular fishery since entangling gear is not often retrieved or, when retrieved, lacks adequate identifiers to determine the fishery from which it originated. Since NMFS has been unable to determine the origin of the gillnet gear involved in the whale entanglements, including the gear involved in the 1999 right whale mortality, NMFS could not assume that these entanglements were not the result of the monkfish gillnet fishery.

Takes of sea turtles have also been recorded from monkfish trips. The 1998 Opinion provided an ITS for turtles in the monkfish fishery which was exceeded in 1999 when NMFS fishery observers documented the take of nine loggerhead (three live and six dead) and one dead Kemp's ridley during two trips targeting monkfish off the coast of North Carolina. Additionally, in April and early May 2000, the carcasses of 281 sea turtles, mostly loggerheads, washed ashore on North Carolina beaches. The monkfish fishery was operating offshore at the time that the turtles were present in the area. Fishing gear retrieved from four loggerhead carcasses was confirmed to be gillnet gear with 10-12 inch mesh; gear that is consistent with the monkfish fishery. In response to these stranding events, on May 12, 2000, NMFS closed an area along eastern North Carolina and Virginia to fishing with large-mesh gillnets with a stretched mesh size of 6 inches (15.24 cm) or greater for a 30-day period. The closed area included all Atlantic Ocean waters between Cape Hatteras and 38°N Latitude (near the Virginia-Maryland border), west of 75°W Longitude, and a specified part of Chesapeake Bay.

As a result of gillnet entanglements in 1999, including one mortality of a right whale and turtle takes in excess of the monkfish ITS, NMFS reinitiated consultation on the Monkfish FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardy to right whales, and the affect of the monkfish gillnet fishery on sea turtles. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures. The Opinion concluded that continued implementation of the Monkfish FMP is likely to jeopardize the existence of the northern right whale. A new RPA has been provided that is expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the monkfish fishery. In addition, a new ITS has been provided for the take of sea turtles in the fishery.

The monkfish rebuilding plan requires that DAS be reduced to zero beginning with the 2002 fishing year and for all subsequent years of the plan. As a result, the directed monkfish fishery is expected to be curtailed until the stock is rebuilt. Monkfish landings are likely to be limited to incidental catch in other fisheries. The reduction in effort should be of benefit to protected species by reducing the number of gear interactions that occur.

Highly Migratory Species Fishery - NMFS' completed the most recent biological opinion on the FMP for the Atlantic highly migratory species fisheries for swordfish, tuna, and shark on June 8, 2001. The Opinion concluded that the pelagic longline and bottom longline fisheries for shark could capture as many as 1,417 pelagic, immature loggerhead turtles each year and could kill as many as 381 of them. The Opinion concluded that these fisheries would be expected to capture 875 leatherback turtles each year, killing as many as 183 of them. Afer considering the status and trends of populations of these two species of sea turtles, the impacts of the various activities that constituted the baseline, and adding the effects of this level of incidental take in the fisheries, the Opinion concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of loggerhead and leatherback sea turtles.

The Opinion outlined one reasonable and prudent alternative, that required NMFS to promulgate regulations that close the entire NED area to fishing with pelagic longline gear for U.S. vessels. The Opinion estimated that this closure would reduce the number of loggerhead and leatherback turtles captured in the fishery by 51 % and 49%, respectively, each year (NMFS SEFSC, 2001; Yeung *et al.*, 2000). Based on logbook data from 1997-1999, this closure would reduce the number of loggerhead and leatherback turtles captured in this fishery by 76% and 65%, respectively, assuming no redistribution of the fishing effort displaced out of the NED. Other elements of the RPA required NMFS to promulgate regulations to modify gear used in the pelagic longline fisheries to reduce the likelihood of interactions between the gear and sea turtles and to reduce the probability of sea turtles being injured or killed during any interactions that occurred. After considering the benefits of the measures contained in the RPA, the Opinion expected that 438 leatherback sea turtles, 402 loggerhead sea turtles, and 35 green, hawksbill, and Kemp's ridley turtles might be captured in the fisheries per year.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Based on occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales, particularly humpback whales. The pot gear and staked trap sectors could also entangle whales and sea turtles. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring TEDs in nets in the area of greatest bycatch off the North Carolina and part of the Virginia coast. NMFS is considering a more geographically inclusive regulation to require TEDs in trawl fisheries that overlap with sea turtle distribution to reduce the impact from this fishery. Developmental work is also ongoing for a TED that will work in the flynets used in the summer flounder fisheries. Portions of the summer flounder, scup and black sea bass gillnet sector are subject to the ALWTRP and HPTRP since they contribute to the northeast sink gillnet sector (an MMPA Category I fishery) and mid-Atlantic coastal gillnet fishery (an MMPA Category II fishery). Black sea bass and scup fixed pots are considered lobster traps under the ALWTRP and are also subject to the ALWTRP regulations. Formal consultation on the summer flounder, scup and black sea bass fishery concluded that the operation of the fishery may adversely affect but is not likely to jeopardize the continued existence of listed species. Expected annual incidental take for this fishery includes 15 threatened loggerhead sea turtles and no more than three cumulative of endangered Kemp's ridleys, hawksbill, leatherback or green sea turtles.

Atlantic Mackerel/Squid/Atlantic Butterfish fishery - On April 28, 1999, NMFS completed a formal consultation on the Atlantic Mackerel/Squid/Atlantic Butterfish fishery. This fishery is known to take sea turtles and may occasionally interact with whales and shortnose sturgeon. Several types of gillnet gear may be used in the mackerel/squid/butterfish fishery. Gillnet sectors of this fishery are subject to the requirements of the ALWTRP and the HPTRP as appropriate. Other gear types that may be used in this fishery include midwater and bottom trawl gear, pelagic longline/hook-and-line/handline, pot/trap, dredge, poundnet, and bandit gear. Entanglements or entrapments of whales, sea turtles, and sturgeon have been recorded in one or more of these gear types. An ITS has been issued for the taking of sea turtles and shortnose sturgeon in this fishery. The ITS anticipated the annual take of six loggerhead sea turtles of which no more than three can be lethal takes, two lethal or non-lethal takes of green sea turtles, two lethal or non-lethal takes of Kemp's ridley sea turtles, one lethal or non-lethal take of leatherback sea turtles, and three takes (of which no more than one can be lethal) of shortnose sturgeon. No takes of marine mammals are authorized.

Atlantic Bluefish fishery - Formal consultation on the Atlantic Bluefish fishery was completed on July 2, 1999. NMFS concluded that operation of the fishery under the FMP, as amended, is not likely to jeopardize the continued existence of listed species and not likely to adversely modify critical habitat. Gillnets are the primary gear used to commercially land bluefish. Whales and turtles can become entangled in the buoy lines of the gillnets or in the net panels. The ALWTRP and HPTRP both include measures to reduce the risk of entanglement to marine mammals from gillnet gear. The bluefish fishery is subject to these measures. The bluefish fishery may pose a risk to protected marine mammals, but is most likely to interact with sea turtles (primarily Kemp's ridley and loggerheads) and shortnose sturgeon given the time and locations where the fishery occurs. Takes of sea turtles and shortnose sturgeon was authorized in the ITS issued with the July 2, 1999, Opinion as follows: six takes (no more than three lethal) of loggerhead sea turtles; six lethal or non-lethal takes of Kemp's ridley sea turtles; and one shortnose sturgeon.

The Northeast Multispecies sink gillnet fishery is one of the fisheries in the action area known to entangle whales and sea turtles. This fishery has historically occurred along the northern portion of the action area from the periphery of the Gulf of Maine to Rhode Island in water to 60 fathoms. In recent years, more of the effort in the fishery has occurred in offshore waters and into the mid-Atlantic. Participation in this fishery declined from 399 to 341 permit holders in 1993 and has declined further since extensive groundfish conservation measures have been implemented. Based on 1999 data, NMFS estimated that there were 271 participants in the northeast multispecies sink gillnet fishery as defined under the MMPA. The fishery operates throughout the year with peaks in spring, and from October through February. Data indicate that gear used in this fishery has seriously injured or killed northern right whales, humpback whales, fin whales, and loggerhead and leatherback sea turtles.

The 1997 formal consultation on the Multispecies FMP concluded that the fishery, with modification under the ALWTRP, was not likely to jeopardize listed species or adversely modify critical habitat. However, serious injuries and at least one mortality of a right whale have occurred as a result of entanglements in gillnet gear since the 1997 Opinion. The gillnet gear entanglements may or may not be attributable to the multispecies gillnet fishery. In most cases, NMFS is unable to assign responsibility for a gillnet gear entanglement to a particular fishery since entangling gear is not often retrieved or, when retrieved, lacks adequate identifiers to determine the fishery from which it originated. Since NMFS has been unable to determine the origin of the gillnet gear involved in the whale entanglements, including the gear involved in the 1999 right whale mortality, NMFS could not assume that these entanglements were not the result of the multispecies gillnet fishery.

As a result of gillnet entanglements in 1999, including one mortality of a right whale, NMFS reinitiated consultation on the Multispecies FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardy to right whales. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures. The Opinion concluded that continued implementation of the Multispecies FMP is likely to jeopardize the existence of the northern right whale. A new RPA has been provided that is expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the multispecies fishery.

The *Southeast U.S. Shrimp Fishery* is known to incidentally take high numbers of sea turtles. Henwood and Stuntz (1987) reported that the mortality rate for trawl-caught turtles ranged between 21% and 38%, although Magnuson et al. (1990) suggested Henwood and Stuntz's estimates were very conservative and likely an underestimate of the true mortality rate. Since 1990, shrimp trawlers in the southeastern U.S. are required to use turtle excluder devices (TEDs), which optimally reduce a trawler's capture rate by 97%. Even so, NMFS estimated that 4,100 turtles may be taken lethally or non-lethally annually by shrimp trawlers operating legally under the sea turtle conservation measures, including 650 leatherbacks too big to be released through TEDs, 1,700 turtles taken in try nets, and 1,750 turtles (representing a 3% capture rate) that fail to escape through the TED (NMFS, 1998d), including large loggerheads. A detailed summary of the U.S. shrimp trawl fishery and the Mid-Atlantic winter trawl fishery impacts can be found in the TEWG reports (1998, 2000).

A large proportion of stranded loggerheads and a small proportion of stranded green turtles appear too large to fit through the required minimum-sized TED openings in the shrimp trawl fishery. The relatively large proportion of stranded loggerhead turtles with dimensions greater than the required minimum TED height opening is cause for concern in light of the need to reduce mortality on the northern subpopulation of loggerheads (TEWG 1998). Strandings of loggerhead turtles with body depths greater than the currently required minimum TED height opening has ranged between 33% and 47% of the total measured strandings since 1986. In the three years preceding September 1999 nearly 1,300 stranded loggerhead turtles were deeper bodied than the currently required TED height opening. The problem is acute off the nesting beaches of the eastern Gulf of Mexico and the Atlantic seaboard (Epperly and Teas 1999). It is also noteworthy that, on average, the number of turtle carcasses stranded on ocean-facing beaches may represent, at best, based on evidence obtained via a three-dimensional oceanographic model (Werner et al. 1999), approximately 20% of the total number of available carcasses at-sea (i.e. of turtles dying at sea). Only those turtles killed very close to the shore may be most likely to strand (in NMFS SEFSC 2001, Part I). NMFS has recently reinitiated consultation on the Southeast U.S. Shrimp Fishery to consider a new TED regulation proposed April 5, 2000, to increase the size of openings and reduce mortalities of captured sea turtles.

Fishing vessel effects: Other than entanglement in fishing gear, effects of fishing vessels on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Listed species or critical habitat may also be affected by fuel oil spills resulting from fishing vessel accidents. No collisions between commercial fishing vessels and listed species or adverse effects resulting from disturbance have been documented. However, the commercial fishing fleet represents a significant portion of marine vessel activity. For example, more than 280 commercial fishing vessels fish on Stellwagen Bank in the GOM, an area frequented by ESA-listed whales including humpback, fin and right whales. Therefore, the potential for collisions or other interactions exists.

Fishing vessels typically operate at slower speeds when gear is in the water as compared to when vessels are transiting to and from fishing grounds. Therefore, we would expect fishing vessels to pose the greatest risk of collision with protected species during these times of transit. Because most fishing vessels are smaller than large commercial tankers and container ships, collisions between fishing vessels and protected species are less likely to result in mortality. In addition, collisions are less likely to occur since a fishing vessel operator is more likely to detect and avoid whales. Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species. Larger oil spills may result from accidents, although these events would be rare and involve small areas. No direct adverse effects on listed species or critical habitat resulting from fishing vessel fuel spills have been documented. Given the current lack of information on prevalence or impacts of interactions, there is no reason to assume that the level of interaction with any of the various fishing activities (i.e., collisions, oil spills) discussed in this section would be detrimental to the recovery of listed species.

4. MMPA and ESA Permits - Regulations developed under the MMPA and the ESA allow for the taking of ESA-listed marine mammals and sea turtles for the purposes of scientific research. In addition, the ESA also allows for the taking of listed species by states through cooperative agreements developed per section 6 of the ESA. Prior to issuance of these authorizations for taking, the proposal must be reviewed for compliance with section 7 of the ESA.

Regulations restrict the level of take that may occur as a result of scientific research or from a section 6 agreement. There is a growing concern that repeated harassment as a result of research activities could be detrimental to some species; by disrupting breeding, feeding or nursing. Such effects would be particularly relevant for very small populations such as the western North Atlantic right whales. As of October 2000, there were eight active permits issued jointly under the MMPA and ESA for scientific research involving right whales. Activities covered by the permits include collection of tissue samples, tag attachment, photo-id, and other activities requiring close approach (minimum of 20 feet) (Simona Perry Roberts, 2000). A comprehensive permit review is being conducted to determine the number and type of right whale interactions authorized for the purpose of scientific research, and to assess how such impacts may be affecting right whales.

Sea turtles are also the focus of research activities authorized by permit. There are approximately 15 active scientific research permits directed toward sea turtles that may be found in the action area of this Opinion. Authorized activities range from photographing, weighing and tagging sea turtles incidentally taken in fisheries to blood sampling, tissue sampling (biopsy) and performing laparoscopy on intentionally captured turtles. The number of authorized takes varies widely depending on the research and species involved but may involve the taking of hundreds of turtles annually. Before any permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species), and also reviewed for compliance with section 7(a)(2) to ensure that the action (issuance of the permit) does not result in jeopardy to the species. However, despite these safeguards, there is growing concern that research activities may result in cumulative effects that negatively affect sea turtle populations or subpopulations. Closer monitoring of all activities involving sea turtles may help to provide insight on the effects of research activities on sea turtles.

B. State or private actions

1. State fishery operations - State fisheries are known to interact with protected species. For example, in 1998, three entanglements of humpback whales in state-water fisheries were documented. Sea turtles have frequently been found, unharmed, within the pounds of several state pound-net fisheries. Data from the marine mammal and sea turtle stranding networks are also useful for identifying interactions of protected species with state fisheries. However, documenting the exact number of state fishery interactions with protected species is difficult. Interactions may not always be reported, and stranding data is often insufficient for identifying the exact cause or location of the interaction. For example, recovered carcasses may be too decomposed for a thorough analysis, entangled whales may swim away from the site of the entanglement, and sea turtles that drown as a result of an interaction leave no visible clue as to the type of gear encountered. For these reasons, the extent of take of ESA-protected species in fisheries that operate strictly in state waters cannot be fully determined. The NMFS is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters.

Early in 1997, the *Commonwealth of Massachusetts* implemented restrictions on lobster pot gear in the state water portion of the Cape Cod Bay critical habitat during the January 1 – May 15 period to reduce the impact of the fishery on North Atlantic right whales. The regulations were revised prior to the 1998 season. State regulations impact state permit holders who also hold federal permits, although effects would be similar to those resulting from federal regulations during the January 1- May 15 period. The Massachusetts Division of Marine Fisheries has taken action to reduce the amount of abandoned lobster gear in Cape Cod Bay. Working with conservation and fisheries industry groups, participants worked together to remove abandoned fishing gear from Cape Cod Bay over the course of several weeks in spring 2000. Most abandoned gear in the bay is lobstering-related buoys, ropes and pots which pose a risk to right whales and other protected species (Associated Press, 2000). In a further move to aid right whales and other protected species, the Commonwealth of Massachusetts has implemented Winter/Spring gillnet restrictions in state waters comparable to those in the ALWTRP.

The ASMFC approved a new *Atlantic herring plan and Amendment 1 to the plan* in October 1998. This plan is complementary to the NEFMC FMP for herring and includes similar measures for permitting, recordkeeping/reporting, area-based management, sea sampling, Total Allowable Catch (TAC) management, effort controls, use restrictions, and vessel size limits as well as measures addressing spawning area restrictions, directed mealing, the fixed gear fishery, and internal waters processing operations (transfer of fish to a foreign processor in state waters). The ASMFC plan, implemented through regulations promulgated by member states, is expected to benefit listed species and critical habitat by reducing effort in the herring fishery.

2. Private and commercial vessels operate in the action area of this consultation and have the potential to interact with whales and sea turtles. Shipping traffic, private recreational vessels, and private businesses such as high-speed catamarans for ferry services and whale watch vessels all contribute to the risk of vessel traffic to protected species. Shipping traffic to and from east coast ports poses a serious risk to cetaceans. Out of 27 documented right whale mortalities in the North Atlantic from 1970 to 1991, 22% were caused by ship propellor injuries (Perry *et al.*, 1999). Hamilton *et al.* (1998), using data from 1935 through 1995, estimated that an additional 6.4% of right whales exhibit signs of injury from vessel strikes. In Massachusetts Bay, alone, shipping traffic is estimated at 1,200 ship crossings per year with an average of three per day. Recreational traffic, including sportfishing, can also pose a risk to protected species. Sportfishing contributes more than 20 vessels per day from May to September on Stellwagen Bank in the Gulf of Maine. Similar traffic may exist in many other areas within the scope of this consultation which overlap with whale and sea turtle high-use areas. Vessel interactions with sea turtles are known to be a problem along the east coast. The Sea Turtle Stranding and Salvage Network has reported many records of propellor injuries to sea turtles, however it is often times difficult to determine if the injuries were pre or post-mortem. High-speed catamarans for ferry services and whale watch vessels operating in congested coastal areas also contribute to the potential for impacts.

Other than injuries and mortalities resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. Attempts have been made to evaluate the impacts of vessel activities such as whale watch operations on whales in the Gulf of Maine. However, no conclusive detrimental effects have been demonstrated.

3. Other Potential Sources of Impacts in the Baseline - A number of anthropogenic activities that may indirectly affect listed species in the action area of this consultation include dredging, ocean dumping and disposal, sonic activities, discharges from wastewater systems, and aquaculture. The impacts on listed species from these activities are difficult to measure. The section 7 process is used to support close coordination on dredging activities and disposal sites in order to develop monitoring programs and ensure that vessel operators do not contribute to vessel related impacts.

The impact of acoustic activities on marine mammals has received increasing attention over the last several years. One of the difficulties in assessing projects that have acoustic impacts is determining the effect of the activity on marine mammals. In addition, given the differences in life histories and physiology of the various species, it is unlikely that acoustic activities affect all marine mammals in the same manner. To address these issues and others, the NMFS hosted two workshops, one was June 12-13, 1997 and the other in September 1998 to gather information to support development of new acoustic criteria.

The U.S. Navy's use and testing of new types of sonar has received considerable attention following a stranding event in 2000. On March 15, 2000, nineteen cetaceans stranded in the Bahamas. Navy operations were being conducted in the area at the time of the strandings, and reportedly included testing for a program known as Littoral Warfare Advanced Development (LWAD) [00-1 Sea Test] that uses a pattern of sonobuoys. NMFS and the Navy are currently investigating whether these activities or other Navy activities in the area contributed to the cetacean strandings. Future Navy operations will require section 7 consultation.

Some aquaculture projects, permitted by the ACOE are occurring in Cape Cod Bay Critical Habitat, and in inshore areas off the Massachusetts, New Hampshire and Maine coasts where ESA-listed cetaceans and sea turtles are known to occur. Aquaculture operations in these areas could pose a risk to listed species by increasing the opportunity for gear entanglements or by affecting habitat. NMFS is coordinating research to measure habitat related changes in Cape Cod Bay and to help ensure that aquaculture facilities do not contribute to entanglements. Many applicants have voluntarily agreed to alter the design of their facilities to minimize or eliminate the use of lines to the surface that may entangle whales and/or sea turtles.

C. Conservation and recovery actions shaping the environmental baseline

A number of activities are in progress that may ameliorate some of the threat that activities summarized in the *Environmental Baseline* pose to threatened and endangered species. These include education/outreach activities, gear modifications, and measures to reduce ship and other vessel impacts to protected species. Many of these measures have been implemented to reduce risk to critically endangered right whales. As a result, the measures typically focus on areas in the northeast and southeast that are frequented by right whales. Despite the focus on right whales other cetaceans will likely benefit from the measures as well. Other directed activities have been taken to benefit sea turtles.

The ***Atlantic Large Whale Take Reduction Plan (ALWTRP)*** includes restrictions on the American lobster, northeast multispecies, monkfish, dogfish and Atlantic pelagic fisheries described above as well as the mid-Atlantic coastal gillnet fishery as defined under the MMPA. This plan has two goals established by the 1994 Amendments to the MMPA. The short-term goal was to reduce serious injuries and mortalities of right whales in U.S. commercial fisheries to less than 0.4 animals per year by January 1998. The long-term goal is to reduce entanglement-related serious injuries and mortalities of right, humpback, fin, and minke whales to insignificant levels approaching a zero rate of serious injury and mortality within 5 years of its implementation.

The ALWTRP is a multi-faceted plan that includes both regulatory and non-regulatory actions. Measures developed per the ALWTRP were implemented first in an interim final rule published July 22, 1997. The February 16, 1999, final rule modified the previous interim final rule and implemented the regulatory tools of the ALWTRP including a combination of broad gear modifications and time-area closures supplemented by progressive gear research, expanded disentanglement efforts, extensive outreach efforts in key areas, and an expanded right whale surveillance program to supplement the new Mandatory Ship Reporting System. However, despite these measures, whale entanglements in gillnet gear, including one mortality of a right whale in 1999, have occurred. The regulatory portion of the ALWTRP was, therefore, amended by interim final rule published on December 21, 2000, (65 FR 80368). The measures, which became effective on February 21, 2001, focus on reducing the risk of entanglement for right whales from gillnet gear fished east of 72º30'W Longitude in the northeast and lobster gear fished in the northeast and mid-Atlantic, through gear modifications. NMFS chose to implement the Atlantic Large Whale Take Reduction Team (ALWTRT) recommendations for gear modifications to northeast gillnet and lobster gear, and mid-Atlantic lobster gear as quickly as possible through an interim final rule in order to provide additional protection for large whales, particularly the northern right whale, during the next full summer season. Additional mid-Atlantic and Southeast gear modifications are anticipated.

Further information on ALWTRP regulations to the gillnet sector is found in the Description of the Proposed Action (Section III(C)) and the Effects of the proposed Action (Section VI (B))of this Opinion. A complete copy of the ALWTRP regulations can be obtained at the Northeast Regional Office by calling (978) 281-9278, or by accessing the website at: http//www.nero.nmfs.gov/whaletrp. A summary of the characteristics of the non-regulatory portion of the ALWTRP is discussed below.

The Sighting Advisory System documents the presence of right whales in and around critical habitat and nearby shipping/traffic separation lanes in order to provide information to mariners with the intent of averting ship strikes. Through a fax-on-demand system, fishermen and other vessel operators can obtain Sighting Advisory System sighting reports, and make necessary adjustments in operations to decrease the potential for interactions with right whales. The Sighting Advisory System has also served as the only form of active entanglement monitoring in the critical habitat in Cape Cod Bay and Great South Channel. Some of these sighting efforts have resulted in successful disentanglement of right whales. Sighting Advisory System flights have also contributed sightings of dead floating animals that can occasionally be retrieved to increase our knowledge of the biology of the species and effects of human impacts. The Commonwealth of Massachusetts has been a key collaborator to the SAS effort and has continued the partnership. The USCG has also played a vital role in this effort, providing air and sea support as well as a commitment of resources to the NMFS operations. Other potential sources of sightings include the U.S. Navy, Northeast Fisheries Science Center/NOAA and independent research vessels. Canada funded a small number of flights in 2000 in the Bay of Fundy and is expected to do the same this year.

The Northeast Fisheries Science Center (NEFSC) conducts aerial surveys, on an annual basis, for cetacean population assessment in the North Atlantic. The principal purpose of the survey effort is to provide an estimation of abundance and determination of population structure of cetaceans. Survey efforts are directed to provide photo identification of right whales in known critical habitat areas and to research other areas of right whale aggregation in the North Atlantic. Aerial survey efforts by the NEFSC have provided initial reports of entangled large whales and provided support for disentanglement efforts. Sighting information from these flights is forwarded to the Sighting Advisory System for fax on demand distribution to mariners.

The *Whale Disentanglement Network* The Center for Coastal Studies, under NMFS authorization, has responded to numerous calls since 1984 to disentangle whales entrapped in gear, and has developed considerable expertise in whale disentanglement. NMFS has supported this effort financially since 1995. In recent years, NMFS has greatly increased funding for this network, purchasing equipment caches to be located at strategic spots along the Atlantic coastline, supporting training for fishers and biologists, purchasing telemetry equipment, etc. This has resulted in an expanded capacity for disentanglement along the entire Atlantic seaboard, including offshore areas. However, there is still limited ability to observe and respond to offshore events. MOU's developed with the USCG ensure their participation and assistance in the disentanglement effort. Hundreds of Coast Guard and Marine Patrol workers have received training to assist in disentanglements. Currently, approximately 573 fishermen and other individuals have also been trained at either Level I or II and another 31 trained at Level III or IV in the disentanglement network. As a result of the success of the disentanglement network, NMFS believes that many whales that may otherwise have succumbed to complications from entangling gear have been freed and survived the ordeal. NMFS did not receive adequate funding for this activity in FY 2001 (October 2000 through September 2001). A contract entered into between NMFS and Center for Coastal Studies provides adequate support for disentanglement through June/July 2001. At this time it appears that funds will be provided by the Northeast Consortium and other parties for this critical activity.

Gear research and development is a critical component of the ALWTRP, with the aim of finding new ways of reducing protected species-gear interactions while still allowing for fishing activities. The gear research and development program follows two approaches: (a) reducing the number of lines in the water without shutting down fishery operations, and (b) devising lines that are weak enough to allow whales to break free and at the same time strong enough to allow continued fishing. This aspect of the ALWTRP is also important in that it incorporates the knowledge and participation of the fishing industry for developing and testing modified and experimental gear.

The Northeast Recovery Plan Implementation Team (NEIT) was founded in 1994 to help implement a right whale recovery plan developed under the Endangered Species Act. Through the NEIT, NMFS has implemented a number of activities that may ameliorate some of the potential threats from state, federal, and private activities. The NEIT is comprised of federal and state regulatory agencies, and representatives of private organizations, and is advised by a panel of scientists with expertise in right and humpback whale biology. The NEIT provides advice and expertise to address the issues affecting right whale and humpback whale recovery. Examples of NEIT activities include: (a) a food web study to provide a better understanding of whale prey resource requirements and the activities that might affect the availability of plankton resources to feeding right whales in the Gulf of Maine, and (b) a comprehensive plan for reducing ship strikes of right and humpback whales in the Northeast.

The Ship Strike Committee of the Northeast Implementation Team has undertaken several efforts to reduce ship collisions with northern right whales. A video titled: Right Whales and the Prudent Mariner, was prepared in 1999 and copies have been distributed to mariners through multiple avenues. The intent of the video is to educate mariners regarding the distribution and behavior of right whales in relation to vessel traffic. The video raises the awareness of mariners as to the plight of the right whale in the North Atlantic and solicits the industry to become part of the solution.

A discussion draft paper titled: Right Whales and Ship Management Options was prepared in the summer of 2000 and presented to the maritime industry in a series of workshops from Georgia to Massachusetts. This paper seeks to address the regulation of vessel traffic, in terms of vessel speed or routing, in an effort to reduce ship strikes in areas of known right whale concentrations. A follow on workshop with the maritime industry is scheduled for April 2001 at the USCG Academy. This workshop seeks industry participation in addressing this issue and comments on the management options described in the discussion draft document.

Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. Nearly all of the measures described below include some education/outreach component. For example, outreach efforts for fishermen under the ALWTRP are fostering a more cooperative relationship between all parties interested in the conservation of threatened and endangered species. NMFS has also been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. NMFS has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NMFS intends to continue these outreach efforts in an attempt to increase the survival of protected species through education on proper release techniques.

Mandatory Ship Reporting System (MSR) - Ship collisions pose a serious risk to large whales, particularly right whales. As a result, actions are being taken to reduce the risk of ship strikes to protected cetaceans. The USCG educates mariners on whale protection measures and uses its programs – such as radio broadcasts and notice to mariner publications – to alert the public to potential whale concentration areas. In April 1998, the USCG submitted on behalf of the United States, a proposal to the International Maritime Organization (IMO) requesting approval of a MSR in two areas off the east coast of the United States. The system became operational in July 1999, and requires ships greater than 300 gross tons to report to a shore-based station when they enter two key right whale habitats – one off the northeast U.S. and one off the southeast U.S. In return, ships receive a message about right whales, their vulnerability to ship strikes, precautionary measures the ship can take to avoid hitting a whale, and locations of recent sightings. Much of the program is aimed at increasing mariner's awareness of the severity of the ship strike problem and seeking their input and assistance in minimizing the threat of ship strikes.

Disturbance was identified in the Recovery Plan for the western north Atlantic right whale as one of the principal human-related factors impeding right whale recovery (NMFS 1991b). As part of recovery actions aimed at minimizing human-induced disturbance, NMFS published an interim final rule in February 1997 (62 FR 6729) restricting vessel approach to right whales to 500 yards (50 CFR 224.103(b)). Exceptions for closer approach are provided when: (a) compliance would create an imminent and serious threat to a person, vessel or aircraft, (b) a vessel or aircraft is restricted in its ability to maneuver around the 500 yard perimeter of a whale and unable to comply with the right whale avoidance measures, (c) a vessel is investigating or involved in the rescue of an entangled or injured right whale, (d) the vessel is participating in a permitted activity, such as a research project, and (e) for aircraft operations, unless that aircraft is conducting whale watch activities. If the vessel operator finds that he or she has unknowingly approached closer than 500 yards, the rule requires that a course be steered away from the whale at a slow, safe speed. Similarly, aircraft are required to take a course away from the right whale and immediately leave the area at a constant airspeed. The regulations are consistent with the Commonwealth of Massachusetts' approach regulations for right whales.

Sea Turtle Conservation Measures - Although measures to address threats to sea turtles within the action area of this consultation are less numerous than those for right whales and other cetaceans, some activities are directed at reducing threats to sea turtles in northeast and mid-Atlantic waters. These include an extensive array of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate live stranded turtles, including cold-stunned turtles. Data collected by the STSSN are used to monitor stranding levels, monitor the incidence of disease, study toxicology and contaminants, study aging, monitor Kemp's ridleys from the head-start program, and conduct genetic studies to determine population structure. STSSN participants also opportunistically tag live turtles (either via the stranding network through incidental takes or in-water studies). Tagging studies help provide basic life history information, including sea turtle movements, longevity, and reproductive patterns. In some cases, an STSSN-wide protocol is developed to address a particular problem. For example, currently all of the states that participate in the STSSN are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of the small subpopulation of northern nesting loggerheads. Unlike cetaceans, there is no organized, formal program for at-sea disentanglement of sea turtles. However, recommendations for such programs are being considered by NMFS pursuant to conservation recommendations issued with several recent section 7 consultations. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen.

NMFS regulations require fishermen to handle sea turtles in such a manner as to prevent injury. As stated in 50 CFR 223.206(d)(1), any sea turtle taken incidentally during fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to a series of procedures. These handling and resuscitation regulations are currently being amended, but the appropriate procedures that fishermen must follow are included in the terms and conditions of this, as well as all other, Biological Opinion's Incidental Take Statement.

Turtle Excluder Devices (TEDs) - Interactions with fishing gear pose a risk to sea turtles as well as cetaceans. NMFS has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries. Many of these are focused on fisheries that primarily operate in waters south of the action area for this consultation, such as the shrimp fishery. However, TEDs, which were first developed to address the take of turtles in the shrimp trawl fishery, have been used in summer flounder trawls in the mid-Atlantic area (south of Cape Henry, Virginia) since 1992. It has been estimated that TEDs exclude 97 percent of the turtles caught in such trawls. The regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), flotation, and more widespread use. However, recent studies have shown that the current TED openings may not allow for the release of large juvenile and adult sea turtles (Epperly and Teas, 1999). As fisheries expand to include underutilized and unregulated species, trawl effort directed at these species may be an undocumented source of mortality for which TEDs should be considered. NMFS is also working to develop a TED that can be effectively used in a type of trawl known as a flynet, which is sometimes used in the mid-Atlantic and northeast fisheries for summer flounder, scup, and black sea bass. Regulations will be formulated to require use of TEDs in this fishery if observer data demonstrate a need for such TEDs.

D. Summary and synthesis of the status of species and environmental baseline

In summary, the potential for vessels, military activities, fisheries, *etc.* to adversely affect whales and sea turtles remains throughout the action area of this consultation. However, recovery actions have been undertaken as described and continue to evolve. Although those actions have not been in place long enough to evaluate their effectiveness on the right whale population (or other listed species populations) they are expected to benefit the right whale and other listed species. These actions should not only improve conditions for listed whales and sea turtles, they are expected to reduce sources of human-induced mortality as well. However, a number of factors in the existing baseline for right whales, loggerhead sea turtles and leatherback sea turtles leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with both state and federal fisheries:

- The northern right whale population continues to decline. Based on recent estimates, this population currently numbers fewer than 300 individuals. Thirty calves have been observed in 2001. However, the high number of calves produced this year must be weighed against the near failure of calf production over the past several years. In addition, at least three of the thirty calves have already died. In addition to ship strikes, entanglement of right whales in gillnet gear continue to occur despite measures developed per the initial ALWTRP. New ALWTRP measures became effective as of February 21, 2001, but these apply only to portions of the area where the fishery operates at times when northern right whales may be present.

- The leatherback sea turtle is declining worldwide. The environmental baseline includes several ongoing sources of mortality incurred by this population which may exceed the 1% sustainable level projected by Spotila *et al.* (1996).

- The northern subpopulation of loggerhead sea turtles has been characterized as stable or declining, and currently numbers only about 3,800 nesting females. The percent of northern loggerheads represented in sea turtle strandings in northern U.S. Atlantic states is over-representative of their percentage in the overall loggerhead population. Current take levels from other sources, particularly fisheries (especially trawl and gillnet fisheries), are high.

V. EFFECTS OF THE PROPOSED ACTION

This section of a biological opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

It is unlawful to "take" species listed under the ESA. The term "take" as defined by the ESA, means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. "Harm" is defined to include any act which actually kills or injures fish or wildlife and includes significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering.

Pursuant to Section7(a)(2) of the ESA (16 USC 1536), federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This biological opinion examines the likely effects of the proposed action on listed species within the action area to determine if the dogfish fishery is likely to jeopardize the continued existence of the species. This analysis is done after careful review of the listed species' status and the factors that affect the survival and recovery of that species, as described above.

Species' Response to an Action

A species' response to an action will depend on the number of individuals, or amount of habitat, that are affected, although the age, sex, breeding status, and distribution of affected individuals, as well as the genetic variability within the remaining population, are equally important because they determine a population's ability to recover from the loss of individuals.

Over the short-term, the survival of listed species will largely depend on their ability to retain sufficient abundances that enable the populations to persist in the face of random events that could drive them to extinction. Chance events operate at several levels that affect the likelihood of extinction, including demographic, environmental, and genetic stochasticity. Listed species populations, because they are defined as either in danger of becoming extinct (endangered) or likely to become endangered in the foreseeable future (threatened), are typically very small populations.

When populations become small, there is concern that changes in population dynamics can take place which make the populations more susceptible to extinction and less able to recover. One example is a decline in the reproductive success due to a decrease in population size, which is variously known as depensation, an Allee effect, and inverse density dependence. Average productivity may decline due to a skewed sex ratio, or from decreasing spatial and temporal overlap between males and females. Such depensatory dynamics in a population where abundance has been severely reduced may preclude the population from recovering, even when mortality is reduced.

Genetic risks include the loss of genetic variation in a population, which results in decreased fitness through random genetic drift (Primack 1993). A population remains viable when it maintains sufficient genetic variation for evolutionary adaptation to a changing environment. The genetically effective population size[3] conveys information about expected rates of inbreeding and genetic drift, which can affect fitness and adaptive potential (Hedrick and Miller 1992 *in* Meffe and Carroll 1997).

Primack (1993) wrote:

> "The smaller a population becomes, the more vulnerable it is to demographic variation, environmental variation, and genetic factors that tend to reduce population size even more and drive the population to extinction. This tendency of small populations to decline towards extinction has been likened to a vortex effect (Gilpin and Soule 1986). For example, a natural catastrophe, environmental variation, or human disturbance could reduce a large population to a small size. This small population could then suffer from inbreeding depression, with an associated lower juvenile survival rate. This

[3]Genetically effective population size is the functional size of a population, in a genetic sense, based on the numbers of actual breeding individuals and the distribution of offspring among families.

> increased death rate could result in an even lower population size and even more inbreeding. Similarly, demographic variation will often reduce population size, resulting in even greater demographic fluctuations and a greater probability of extinction. These three factors–environmental variation, demographic variation, and loss of genetic viability–act together so that a decline in population size caused by one factor will increase the vulnerability of the population to the other factors."

Long-lived marine species may be particularly vulnerable to human perturbations which increase mortalities at all life stages. Annual survival rates of some stages, particularly large juveniles and adults, may be extremely critical to population maintenance and recovery. Species with delayed maturity, such as right whales, fin whales, male sperm whales, and sea turtles, are vulnerable to increases in mortality of juveniles (sub-adults) and adults – those life stages with the highest reproductive value.

Potential Biological Removal Level

The potential biological removal level provides a standard method by which to determine and track the status of marine mammal stocks that are found in U.S. waters. PBR is a measure, developed under the MMPA, to determine the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. PBR was developed to be a conservative estimate given the uncertainties in estimating the size of marine mammal stocks, their productivity rate, and their ability to recover. It is calculated by using the minimum estimate of the population stock, one-half of the maximum theoretical or estimated net productivity rate of the stock, and a recovery factor of 0.1 for ESA-listed marine mammals. It is used in this document to help assess the status of ESA-listed cetaceans considered in this opinion.

A. Effects of the Dogfish Fishery as it currently operates

The effects of the proposed action on ESA-listed cetaceans and sea turtles were analyzed by considering the known effects of the Spiny Dogfish fishery on the status of the species, and taking into account the likely response of the species to the proposed action.

The proposed action is the continued authorization of the Spiny Dogfish FMP. All the marine mammals and sea turtles considered in this consultation are found in the action area for the spiny dogfish fishery. Spiny dogfish are landed in all months of the year and throughout a broad area along the Atlantic coast, principally from Maine to North Carolina. However, the distribution of those landings varies by area and season. During the fall and winter months, spiny dogfish are landed principally from Mid-Atlantic waters and southward from New Jersey to North Carolina. During the spring and summer months, spiny dogfish are landed mainly from northern waters from New York to Maine.

Numerous gear types are reported to take spiny dogfish, based on NMFS weighout data. However, two principal types, trawls and gillnets, historically account for the majority of spiny dogfish commercial landings. Of the gear types used, sink gillnets have resulted in the most endangered species takes.

Data indicate that the gillnet gear like that used in this fishery has seriously injured right, humpback and fin whales, and loggerhead and leatherback sea turtles. For example, Waring et al. (1997) reports that 17 serious injuries or mortalities of humpback whales from 1991 to 1996 were fishery interactions (not necessarily dogfish gear), the majority of which were attributable to some kind of monofilament gear, similar to that used in the dogfish fishery. However, it is often difficult to assess gear found on stranded animals or observed on species at sea and assign it to a specific fishery. Only a fraction of the takes are observed, and the catch rate represented by the majority of takes, which are reported opportunistically, (*i.e*., not as part of a random sampling program), is unknown. Consequently, documented takes are underestimated and the total level of interaction cannot be determined through extrapolation. The dominant gear sector in the fishery is sink gillnet gear, so entanglement in that gear type would be most likely. Therefore, entanglement in dogfish gear is possible when the fishery operates in times and areas used by ESA protected species

The overall location of the dogfish fishery is poorly understood, but some information is available from the NMFS Sea Sampling coverage directed at the groundfish gillnet fishery. These data suggest that dogfish are caught incidentally in other gillnet fisheries over a much larger area than is used by the directed fishery. NMFS trawl surveys have recorded presence of adult dogfish over an even larger area. Based on NMFS' Sea Sampling plots of gillnet effort in the Gulf of Maine, there is broad spatial overlap of the dogfish fishery in inshore waters with several listed species of whales and sea turtles. In addition, dogfish prey upon some of the same small schooling fishes that are targeted by humpback and fin whales, so there may be potential for small-scale overlap as well.

The stock recovery schedule in this FMP specifies mandatory reductions in spiny dogfish fishing mortality. It was predicted that fishing effort directed at spiny dogfish would be reduced by about 30% in 2000 and in excess of 90% in years 2-5 of the rebuilding period. Under the proposed rebuilding plan for spiny dogfish, the directed fishery for this species will be closed for four years following the first year exit fishery. During the rebuilding phase (years two-five) fishing effort directed towards spiny dogfish is predicted to be eliminated. Therefore, if fishing effort directed towards dogfish is eliminated, the chance of incidental takes of marine mammals and sea turtles should also be reduced during the rebuilding phase.

The quota and trip limit specifications for the 2001 spiny dogfish fishery were finalized on May1, 2001. The stock recovery schedule for the spiny dogfish FMP specifies mandatory reductions in spiny dogfish fishing mortality. This should allow a phase out of the directed spiny dogfish during the recovery schedule and limit landings to incidental catch in other fisheries. The Mid-Atlantic Fishery Management Council (MAFMC) recommended limits of 600 lb/trip for quota period 1 and 300 lb/trip for quota period 2. This recommendation may pose less of a threat to ESA-listed species since dogfish landings are likely to be limited to incidental catch in other fisheries. Therefore, the fishing effort in the management areas inhabited by endangered species would not be expected to increase. NMFS proposed a commercial spiny dogfish quota of 4 million lb (1.81 million kg) for the 2001 fishing year and to implement the possession limits that were recommended by the Monitoring Committee and the MAFMC. These limits are: 600 lb (272 kg) for period 1, and 300 lb (136 kg) for period 2 and were finalized May 1, 2001.

During the remaining years of the rebuilding period, entanglement potential may be reduced to very low levels. Once the spiny dogfish stock is rebuilt, the fishery will be prosecuted at a greatly reduced level compared to the unregulated fishery prior to implementation of the FMP. Overall, effort directed at spiny dogfish after the stock is rebuilt should be reduced by about 70-75% compared to the recent unregulated fishery. Assuming the projections of fishing effort is accurate, the effect of this FMP should reduce the chance of entanglements of protected species in the spiny dogfish fishery. As noted earlier, fishing effort after the rebuilding period is not expected to exceed 30 percent of current levels, so the entanglement potential represented by the fishery at that point would be substantially less than that represented by the unregulated fishery. However, as long as some level of fishing effort continues, there remains a potential for entanglement during dogfish fishery operations.

Although the FMP may result in a reduction in entanglement risk represented by vessels targeting dogfish, the degree to which overall entanglement potential in the action area will be affected is unknown. It is not possible to predict whether vessels will cease fishing altogether or whether effort will be shifted to other regulated or unregulated fisheries. Heavy restriction of the multispecies and monkfish fisheries limits potential for shifts into those fisheries. The Councils note that the FMP could result in shift of effort to the weakfish, croaker, or king whiting fisheries. Entanglement of listed species has been documented in these fisheries.

The FMP includes a provision for the authorization of experimental fisheries on a limited basis. Depending on the terms of an experimental fishery, this measure may increase entanglement risk in some areas over what is expected for the FMP in general. However, authorization of experimental fisheries require consultation with NMFS, Protected Resources Division and will be reviewed on a case by case basis.

The majority of supporting administrative measures in the FMP are not expected to affect protected species directly. However, some measures may have a beneficial impact on protected species management. The requirement for vessels participating in the dogfish fishery to obtain a permit and comply with mandatory data reporting and observer requirements will facilitate monitoring of effort and its impact on protected species and critical habitat.

The Dogfish FMP does not currently contain a surface gear rigging or marking requirement or a gillnet tagging requirement. Therefore, monitoring of impacts of the dogfish fishery on whales is compromised since it may not be possible to distinguish fragments of this gear from other fixed gear fisheries.

1. Whales (Cetaceans)

As described previously, the six species of protected whales found in the action area for this consultation are the right, humpback, fin, blue, sei and sperm whales. The fishery is most likely to interact with right, humpback, and fin whales. Blue, sei, and sperm whales do not frequent inshore waters and are therefore not as likely to encounter dogfish gear.

As mentioned previously, the primary gear types used by the dogfish vessels are trawls and gillnets. The dominant gear sector in the fishery is sink gillnet gear. Although entanglement in trawl and bottom longline gear has been documented, confirmed instances are rare relative to gillnet entanglements. Sink gillnet gear has been documented to entangle right whales.

Surface buoys and buoy lines are used to mark the location of fixed gear including lobster traps and gill nets. Whales could become entangled in buoy lines, anchor lines or net panels of the gillnets (Figure 2). Polypropylene (floating) lines between the buoy line and anchor line have been identified as a serious entanglement risk to large whales. NMFS Research team is exploring the use of neutrally buoyant line as an alternative to floating lines used in gillnet gear. Unfortunately, so little is known about the entanglement mechanism and behavior of the whales, that some of the protective measures put into gear modifications may not solve the problem for whales. It is surmised that, when gear is left fishing unattended, the animal encounters a line, it may move along that line until it comes up against something such as a buoy. The buoy can then be caught in the baleen, against a flipper or on some other body part. When the whale feels the resistance of the gear, it thrashes, which may cause it to become entangled. Another mechanism of entanglement is that a whale might hit the vertical "wall" of the gill net and become entangled in the net as the net wrapped around the whale's body.

Interactions between whales and dogfish gear may occur where fishing effort overlaps with whale distribution. In New England the effort is concentrated from spring through summer, but occurs year round. Therefore, operation of the dogfish fishery has the potential for overlapping with right, humpback, and fin whale distribution. Emphasis is placed on these species because their feeding behavior and distribution patterns make them more susceptible to interactions with floating surface lines and buoys. Despite efforts to reduce these interactions recent documented entanglements have continued.

The dogfish fishery is active at some times and areas which vary from those exhibited by the groundfish fishery. Thus entanglement potential from the dogfish fishery may be different as well. For example, the dogfish gillnet fishery is active in areas such as Stellwagen Bank in the summer when gillnet effort for cod is low. Stellwagen Bank is a high-use area for both humpback and fin whales in the summer months.

Based on landings by state, interactions with right, humpback and fin whales could occur throughout the year. Distribution of these species overlaps the apparent distribution of landings in both northern waters and mid-Atlantic waters. In 1999, landings of dogfish were greatest from June to October in New England waters and greatest from December through March for Mid-Atlantic and south Atlantic areas.

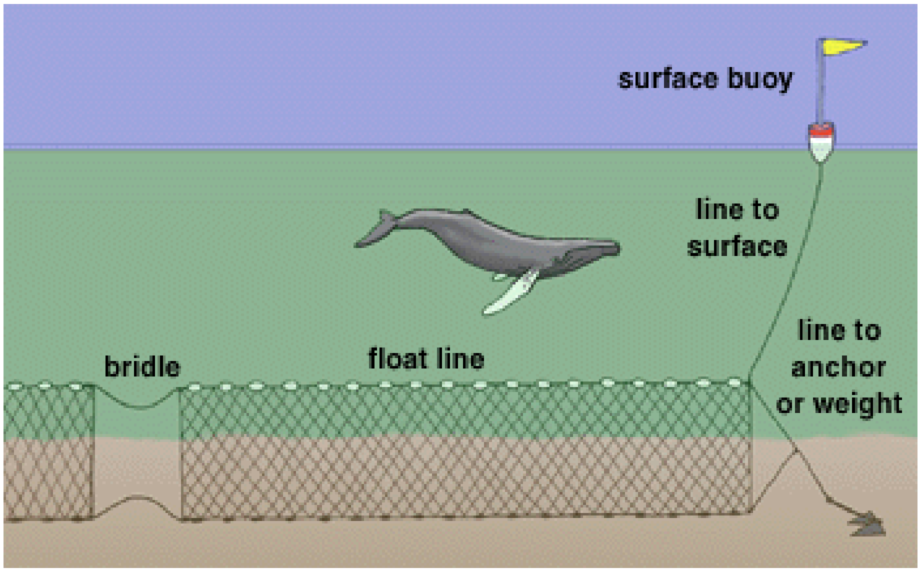

Figure 2. Potential Entanglement points of gillnet gear (source: Center for Coastal Studies)

Marine mammals that forage in areas of concentrated dogfish effort are vulnerable to entanglement in dogfish fishing gear. Factors which appear to influence a whales susceptibility to gear entanglements are a species' physical characteristics (i.e., baleen whales versus toothed whale) and habitat. Baleen whales, such as right, humpback and fin whales, that feed by filtering large volumes of water appear to be susceptible to entanglements with anchored gear that includes floating lines and/or net panels. Floating line can become entangled in baleen when the animal is moving through the water with the mouth gaped for feeding. Knots in the line further hinder the ability of the line to pass through the baleen. In addition, anchors on the gear offer resistance against which the whale may struggle and result in further entanglement of the fishing gear across the mouth and/or body of the whale. In contrast, sperm whales that feed by grasping prey with their teeth appear to be more susceptible to hook and line gear. Fish hooked on such gear may attract sperm whales in some cases. A whale trying to snatch fish off the hook may itself become hooked or entangled in the line/cable to which the hooks are attached. The degree of overlap of fishing gear with a species range also has an important influence on whether a whale becomes entangled. Right whales and humpback whales are more frequent users of inshore and nearshore waters where sink gillnet gear is set as compared to fin, sei or blue whales. Therefore, right and humpback whales may be at greater risk for entanglement in sink gillnet gear as compared to other baleen species. The depth at which whales feed may also influence their risk for entanglement. Evidence exists that right whales feed on zooplankton through the water column, and in shallow waters may feed near the bottom. This is relevant in that sink gillnets are fished on the bottom. Therefore, because of their method of feeding and their overlap with the sink gillnet fishery, right whales appear susceptible to entanglement in both the float lines and nets of sink gillnet gear, and to be more susceptible to such gear than other species of whales.

The probability that a marine mammal will initially survive an entanglement in fishing gear is influenced by the range of the species, the age of the entangled animal, and the severity of the entanglement. Animals entangled in gear near shore are more likely to be observed and are more accessible to the disentanglement team as compared to species which frequent deeper waters. Younger animals are at greater risk for injury from an entanglement since any gear will only become more constricting as the animal grows.

For large whales, there are generally three areas of entanglement: 1) the gape of the mouth, 2) around the flippers, and 3) around the tail stock (Figure 3). Marine mammals may swim away with a portion of the line wrapped around a pectoral fin, the tail stock, the neck or the mouth. Documented cases have indicated that entangled animals may travel for extended periods of time and over long distances before either freeing themselves, being disentangled by an outside network, or dying as a direct or indirect result of the entanglement (Angliss and Demaster, 1998). In most cases, it is unknown whether the injury is serious enough or debilitating enough to lead to death. A sustained stress response, such as repeated or prolonged entanglement in gear makes marine mammals less able to fight infection or disease. If the line is attached to heavy gear, the animal will most likely drown if not disentangled. Entanglements with lighter gear may lead the animal to exhaustion and starvation due to increased drag (Wallace 1985). Younger animals are particularly at risk if the entangling gear is tightly wrapped, for as they grow, the gear will most likely become more constricting. The majority of large cetaceans that become entangled are juveniles (Angliss and Demaster 1998).

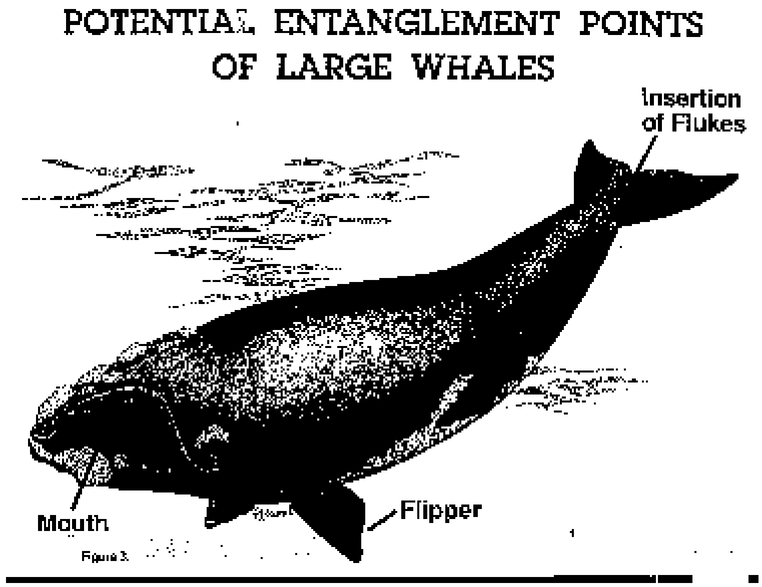

Figure 3. Potential entanglement points of large whales

The primary gear types used in the spiny dogfish fishery are listed under Category I and III of the proposed 2001 List of Fisheries for the taking of marine mammals by commercial fishing operations under section 118 of the MMPA. Category I fisheries are those fisheries for which there is documented information indicating a “frequent” incidental mortality and injury of marine mammals in the fishery. Some of the spiny dogfish gillnet fisheries are in this category, including sink gill net fishing for spiny dogfish in areas where other Northeastern multispecies sink gillnetting occurs. Mid-Atlantic coastal gillnet fisheries are currently listed in Catagory II, but are proposed to be re-listed in Category I. This change would affect spiny dogfish gillnet fisheries prosecuted in the Mid-Atlantic region. With the mandatory reduction in spiny dogfish fishing mortality and subsequent reductions in fishing effort there should be a reduction in the incidental take of marine mammals. However, the reduction of entanglement risk may be offset if the gear is used to target other species. In Category III there is information indicating a “remote likelihood” of incidental taking of a marine mammal in the fishery or, in the absence of information indicating the frequency of incidental taking of marine mammals, other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, and species distribution of marine mammals in the area suggest there is a “remote likelihood” of an incidental take in the fishery. The spiny dogfish trawl fishery is listed as a Category III fishery. There have been no recorded takes of ESA-listed marine mammals in this fishery.

The MMPA requires NMFS to develop a plan to reduce mortalities and serious injuries to marine mammals incidentally taken in commercial fisheries to levels less than the potential biological removal (PBR), approaching a zero mortality and serious injury rate. The Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed to meet this requirement of the MMPA. It primarily focuses on right whales, but is also expected to reduce entanglements of humpback, fin, and minke whales. However, the benefits to humpback, fin and minke whales may be limited in effectiveness because the plan concentrates on right whale distribution to determine area closures. In general, humpback whales inhabit northern waters at the same time as right whales but the spatial overlap may be different depending on prey distribution. As a result of the entanglement events in 1999 and 2000, NMFS revised the ALWTRP with additional gear regulations. The ALWTRP applies to gillnet and lobster gear. The impacts from the ALWTRP plan are discussed later in this section.

Fishing vessels transiting to and from fishing grounds may pose a risk of collision with protected whales in the action area. Current closures established under the MMPA or MSA have reduced fishing vessel operations in key areas in the northeastern states. Existing take prohibitions and right whale approach regulations also appear to be effective deterrents. Finally, fishing vessels are rarely operated at speeds that are likely to pose a risk of collision with whales. As a result, boats associated with the spiny dogfish fishery are not expected, through collisions, to reduce the likelihood of survival and recovery of endangered whales in the wild.

In addition to direct effects resulting from entanglement, interactions between the dogfish fishery and humpback and fin whales may also involve indirect food web effects. The availability of sufficient prey for endangered whales may be affected through competition with the dogfish resource. Spiny dogfish and humpback/fin whales both prey upon small schooling fishes, creating some degree of niche overlap.

As the dogfish fishery recovers, availability of certain prey species such as Atlantic herring may be reduced. Due to a lack of understanding of basic prey requirements of humpback and fin whales, it is not currently possible to determine whether the dynamics of the dogfish resource resulting from the fishery could have an adverse effect on survival and recovery of these species. Below the effects to individual ESA-listed species are analyzed:

a. Right Whales - The North Atlantic right whale population was estimated in 1998 to be 291 individuals (Kraus et al. 2000). In addition, a review by the 2000 IWC workshop indicates that the population is now in decline. In view of the apparent decline in this population (Caswell et al. 1999, IWC 2000), the PBR for this population is set to zero. The total level of human-caused mortality and serious injury in unknown, but is estimated at a minimum of 2.4 (USA waters, 1.4; Canadian water, 1.0) right whales per year since 1994 (Waring et al., 2000). From 1995 through 1999, 5 of 11 records of mortality or serious injury (including records from both USA and Canadian waters) involved entanglement or fishery interactions (Waring et al., in review). The reports often do not contain the detail necessary to assign the entanglements to a particular fishery or location. However, during the period of 1995 through 1999, there were at least three documented cases of entanglements of right whales in gillnet gear.

Right whale (ID# 2110), a female calf, was first photo-identified in 1991 in the Bay of Fundy, Canada. On September 16, 1995 she was sighted entangled in gillnet gear in the Bay of Fundy. A disentanglement team responded and removed a substantial amount of the gillnet gear. She was recently sighted again in the Bay of Fundy on September 9, 2000 with no sign of line attached.

Right whale (ID# 1705), a female, was first photo-identified off Georgia in 1987. She was sighted numerous times with a calf #2605 from Florida to the Bay of Fundy during 1996. On July 18, 1997 she was sighted entangled with gillnet gear in the Grand Manan Basin, Canada. Disentanglement teams were unable to locate the whale and therefore, no disentanglement could be attempted. The whale was sighted again on August 25, 1997 in the Grand Manan Basin and again no disentanglement was possible. The latest sighting of the whale was on September 23, 2000 in the Bay of Fundy with no sign of line attached.

Right whale (ID# 2030), a female, was first sighted in Massachusetts Bay, skim feeding, on July 29, 1990. The whale was sighted on May 10, 1999 entangled in sink gillnet gear near Cultivator Shoal. Disentanglement efforts could not begin until September due to rough seas. The disentanglement attempts were made by CCS in the Bay of Fundy, Canada, partially disentangling 2 wraps of line and attaching a satellite tag. The satellite tag was lost off of New Jersey and on October 20, 1999 the whale was found floating dead five miles East of Cape May, NJ. The retrieved gear appeared to be rigged such that 2 individual weights or anchors could be attached to the ½ inch poly 18 feet from each other. It was this 18 foot section of poly that was across and cutting into the animal's back. The section of gillnet was balled-up and hanging below the left flipper. Net construction appeared to be typical and one of the 11 floats was marked "Made in Canada, SL 325". The bridle end of the gillnet piece was made up using swagged fittings and there was no evidence of tie-downs. No identification (net tags, etc) was found on the gear. The entanglement appeared to occur as a result of the whale swimming between two anchors that were attached to floating line.

There have been eight reports of entangled right whales in 2000, but the reports do not contain the detail necessary to assign the entanglements to a particular fishery or location (See Table 1).

Table 1.

Summary of 2000 Right Whale Entanglements (gear type unknown)

Date	ID #	Biological Information	Location of sighting	Gear description/Comments
1/19/00	2701	3 year old female	Block Island, RI	line around tail stock, no disentangled attempt due to poor weather.
3/1/00	1130	Adult male	Cape Cod Bay	entanglement wounds and discoloration of left pectoral flipper, disentanglement unsuccessful.
3/23/00	1301	17 year old female	Provincetown, MA	Hoop-like scar or gear encircling whale just behind the pectoral flippers, aerial survey team determined it was probably a scar.
3/27/00	1167	Adult male	Martha's Vineyard, MA	200 ft of line and red buoy trailing, attached VHF/satellite telemetry buoy. Whale sighted in Bay of Fundy, free of all gear (8/1/00)
4/7/00	not known	40-45 feet long	Cape Cod Bay	Hoop-like scar or gear apparent on dorsal side, unconfirmed.
5/31/00	1720	unknown, 40feet	Cape Cod Bay	about 30feet of dark line trailing beneath whale, line appears to sink. Sighted again on 6/20/00, whale entangled in the mouth and trailing 80-90 feet of line. No disentanglement attempt was possible.
7/9/00	2746	3 year old, gender unknown	Bay of Fundy	lines entangled in the mouth and around the back, disentanglement successful and sighted 9/7/00 in the Bay of Fundy, with no visible gear.
8/18/00	not known	not known	Bay of Fundy	about 200 feet of floating line trailing behind right pectoral flipper and perhaps mouth. Whale not re-sighted.

Interactions between right whales and dogfish gear may occur where fishing effort overlaps with whale distribution. North Atlantic right whales range from wintering and calving grounds in coastal waters of the southeastern U.S. to summer feeding grounds, nursery and presumed mating grounds in New England and northward to the Bay of Fundy and Scotian shelf (Waring et al. 2000). In the management area as a whole, right whales are present throughout most months of the year, but are most abundant between February and June. They use mid-Atlantic waters as a migratory pathway from the winter calving grounds off the coast of Florida to spring and summer nursery/feeding areas in the Gulf of Maine. Because spiny dogfish are landed in all months of the year and throughout a broad area of right whale distribution, potential for entanglement during any time of the year is possible. Gear interactions may occur in mid-Atlantic waters when right whales are migrating to calving grounds off the coast of Florida coincident with the fall and winter spiny dogfish effort in this area. However, the greatest risk of entanglement occurs during the spring and summer when dogfish are landed from northern waters from New York to Maine, corresponding to the times that right whales are using these areas for feeding/nursing and mating. Given their very low population size, their limited distribution, and their low reproductive rate, any loss of a right whale is expected to affect their survival and recovery by further limiting their numbers, their distribution, and their ability to reproduce.

b. Humpback whales - The best estimate of abundance for the ocean-basin-wide North Atlantic humpback whale is 10,600 (Smith et al., 1998). The best estimate of abundance for Gulf of Maine humpback whale feeding stock is 816. The minimum population estimate for this stock is 568 (Waring et al. in review). Current data strongly suggest that the North Atlantic humpback whale population overall is steadily increasing in the size (Smith et al., 1999) although there are no other feeding-area-specific estimates. The PBR for the Gulf of Maine humpback whale stock is 1.8 whales (Waring et al., in review).

There is an average of four to six entanglements of humpback whales a year in waters of the southern Gulf of Maine (unpublished data, Center for Coastal Studies). Volgenau et al. (1995) reported that gillnets were the primary cause of entanglements and entanglement mortalities of humpbacks in the Gulf of Maine between 1975 and 1990. During the period of 1997 through 2000, NMFS Northeast Regional Office has documented a total of 42 humpback entanglements, with at least eight determined to be caused by gillnet gear (See Table 2). Of the 42 entanglements three were mortalities, including a humpback whale entangled in inshore croaker gillnet which could not be disentangled and died in the gear. The second humpback mortality washed up dead at Squibnocket Beach, Martha's Vineyard, MA on 1/12/99. The cause of death could not be conclusively determined because no gear was present. However, the whale had line marks on the dorsal and ventral surface of tail stock along with torn flesh and connective tissue on the right side of the mouth. In 2000 alone, there were 16 reports of entangled whales, including one mortality, but only one report contained enough information to assign the entanglement to mesh gillnet. The cause of the humpback mortality in 2000 could not be determined, but the necropsy determined rope marks on the leading edge of flukes and ventral peduncle were evident. The whale entangled in mesh gillnet was reported to be badly wrapped in line with gear trailing, offshore of North Carolina. The whale could not be resighted.

Interactions between humpback whales and dogfish gear may occur where fishing effort overlaps with whale distribution. As noted, humpback whales feed in the northwestern Atlantic during the summer months and migrate to calving and mating areas in the Caribbean. Five separate feeding areas are utilized in northern waters after their return; the Gulf of Maine (which is within the management unit of this FMP) is one of those feeding areas. During the winter, the principal range for the North Atlantic population is around the greater and Lesser Antilles in the Caribbean (Waring et al., 2000). As with right whales, humpback whales also use the Mid-Atlantic as a migratory pathway. Since 1989, observations of juvenile humpbacks in that area have been increasing during the winter months, peaking January through March (Swingle et al., 1993). It is believed that non-reproductive animals may be establishing a winter feeding area in the mid-Atlantic since they are more widely distributed in the management area than right whales. Humpbacks feed on a number of species of small schooling fishes, including sand lance and Atlantic herring. As with right whales, the greatest entanglement risk to humpback whales occurs during the spring through fall when they use northern waters to feed and where dogfish fishing effort is greatest. Gear interactions can also occur when humpback whales use the mid-Atlantic waters as migratory routes to wintering grounds. In addition, if young humpbacks are using the mid-Atlantic for winter feeding their risk of entanglement in gillnet gear increases than if they were only transiting.

Table 2.

Summary of Confirmed Humpback Gillnet Entanglements

(Note: Table includes **only** confirmed gillnet entanglements; entanglements may not be observed and many cannot be specified to a gear type or location)

Date	NMFS ID #	Location of sighting	Gear description/Comments
3/4/98	E1	Ocracoke Island, NC	Croaker Gillnet, whale died in active gillnet
5/15/98	E4	Stellwagen Bank, Mass Bay	Gillnet Tied down, swam through net. Float line on back and then wraps on tail stock. CCS disentangled
7/2/98	E12	Stellwagen Bank	Gillnet, Several wraps of gear around tail and float line through mouth. CCS disentangled.
7/10/98	E16	Stellwagen Bank	Gillnet, High flyer toggle buoy and line recovered. CCS disentangled.
7/19/98	E18	Swallow Tail, Grand Manan,	Canadian Gillnet, Line wrapped around body and left pectoral. Partial disentanglement by Westgate.
3/24/99	E2-99	Cape Lookout, NC	Gillnet (mullet, kingfish), single wraps of net around both flukes. Whale disentangled.
7/29/99	E17-99	Platts Bank	Sink gillnet (10" mesh), line in mouth. CCS disentangled.
11/21/00	E35	Cape Hatteras, NC	Gillnet, netting noted on head and tail stock. Partial disentanglement, unknown if free of gear.

Although the number of humpback whale entanglements is high, given their current distribution, the population status and their reproductive rate, and the information available on interactions with dogfish gear, it does not appear that the spiny dogfish fishery is currently affecting the distribution, numbers or reproduction of humpback whales in such a way as to affect the survival and recovery of the species.

c. Fin whales - The best abundance estimate for the North Atlantic fin whale is 2,814 (CV=0.21) (Waring et al., in review). However, this estimate must be considered extremely conservative in view of the known range of the fin whale in the entire western North Atlantic, and uncertainties regarding population structure and exchange between surveyed and un-surveyed areas. The PBR for the western North Atlantic fin whale is 4.7.

Fin whales are common in waters of the U.S. Atlantic EEZ, principally from Cape Hatteras northward. The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic ice pack (Waring et al. 2000). The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. However, based on acoustic recordings from hydrophone arrays, Clark (1995) reported a general southward "flow pattern" of fin whales in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indies. The overall distribution may be based on prey availability and fin whales are found throughout the dogfish management area in most months of the year. There is little doubt that New England waters represent a major feeding ground for the fin whale (Waring et al., in review). As with humpback whales, they feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than right and humpback whales and are less concentrated in nearshore environments. However, because fin whales are found throughout the action area including Stellwagen Bank during the time when the dogfish fishery occurs, the potential for entanglement during dogfish fishery operations exists.

Entanglement of fin whales is rarely documented. Serious injuries or mortalities due to entanglements of fin whales are considered to occur at an insignificant level approaching zero mortality and serious injury rate (Waring et al., 2000). A review of 26 records of stranded or floating (dead or injured) fin whales for the period 1992 through 1996 showed that three had formerly been entangled in fishing gear. Two of these had net or rope marks on the body, and one had line through the mouth and around the tail. Two fin whales were reported entangled in 1998; one was not resighted and the other was a floating carcass found off Digby, Nova Scotia, Canada with netting through the mouth and around the tail flukes. Three fin whales were reported entangled in 1999, all in Canada. Disentanglement attempts were made by the Canadian team on two; one was successfully disentangled, the other was not. The third animal was not resighted. There were no reports of entangled fin whales in 2000.

Given the current distribution and numbers of fin whales as well as their infrequent interactions with dogfish gear, it does not appear that the dogfish fishery is currently affecting the distribution, numbers or reproduction of fin whales in such a way as to affect the survival and recovery of the species.

d. Blue whales - The PBR for the western North Atlantic stock of blue whales is 0.6. There are no confirmed records of mortality or serious injury to blue whales in the USA Atlantic EEZ due to commercial fishing interactions. Although some blue whale-fishery interactions may go unobserved, interactions with the spiny dogfish fishery are likely to be rare since blue whales are only occasional visitors to east coast U.S. waters and favor deep waters where the dogfish fishery is less likely to occur.

e. Sei whales - The total number of sei whales in the USA Atlantic EEZ is unknown. Therefore, the PBR for the sei whale is unknown because the minimum population size is unknown (Waring et al., in review). There was no reported fishery-related mortality or serious injury to sei whales in fisheries observed by NMFS during 1994-1998.

f. Sperm whales - Total numbers of sperm whales off the USA or Canadian Atlantic coast are unknown, although eight estimates from selected regions of the habitat do exist for select time periods (Waring et al., in review). Sightings were almost exclusively in the continental shelf edge and continental slope areas. A minimum population size of 3,505 (CV=0.36) was used to calculate a PBR of 7.0.

At present, because of their general offshore distribution, sperm whales are unlikely to be impacted by dogfish fishing gear compared with other cetaceans with more near shore ranges, and those impacts that do occur are less likely to be recorded. Total annual estimated average fishery-related mortality or serious injury to this stock during 1994-1998 was zero. Fishery entanglements have been documented occasionally, but no mortalities or serious injuries have been documented in the dogfish fishery. Three sperm whale entanglements were documented from August 1993 to May 1998. In October 1994, a sperm whale was successfully disentangled from a fine mesh gillnet in Birch Harbor, Maine. Bycatch has been observed by NMFS Observers in the pelagic drift gillnet fishery, but no mortalities or serious injury have been documented in the pelagic longline, pelagic pair trawl, Northeast multispecies sink gillnet (including the dogfish fishery), mid-Atlantic coastal sink gillnet, or North Atlantic bottom trawl observed fisheries.

2. Sea Turtles

The five species of sea turtles found in the action area for this consultation are the loggerhead, leatherback, Kemp's ridley, green, and hawksbill sea turtles. As is the case for some cetacean species considered in this consultation, all of these turtle species occur in the action area but some are less likely to occur in the area where the dogfish fishery operates.

Interactions between sea turtles and dogfish gear may occur where fishing effort overlaps with turtle distribution. Juvenile and immature Kemp's ridleys and loggerheads utilize nearshore and inshore waters north of Cape Hatteras during the warmer months and can be found as far north as the waters in and around Cape Cod Bay. Sea turtles are likely to be present off the Virginia, Maryland, and New Jersey coasts by April or May, but do not arrive in great concentrations in New York and northwards until mid-June. Although uncommon north of Cape Hatteras, immature green sea turtles also use northern inshore waters during the summer and may be found as far north as Nantucket Sound (Bob Prescott, Mass. Audubon, pers. comm.). Approximately 5 green turtles a year are incidentally captured in pound nets in Long Island Sound (Morreale, pers. comm.). Leatherback and hawksbill turtles may also occur in the waters where the dogfish fishery operates. With the decline of water temperatures in late fall, sea turtles migrate south to warmer waters (USFWS and NMFS, 1992). When water temperatures are greater than approximately 11°C, sea turtles may be present in the action area and may interact with the dogfish fishery.

As mentioned previously, the primary spiny dogfish gear types are sink gillnets, otter trawls, bottom longline, and driftnet gear. The capture of sea turtles could occur in all gear sectors of the fishery, including sink gillnets. Sink gillnets are the principal gear used, followed by otter trawls. Sink gillnets would be most likely to interact with loggerhead, Kemp's ridley, and green sea turtles as these species are more likely to be found near the bottom. These species, as well as leatherback turtles, may also interact with the driftnet sector. Sea turtles may become entangled in either the buoy lines of the gillnets at the surface or at depth or the nets themselves at depth. Turtles are unlikely to be able to break off fragments of the gear and will probably not be able to stay at the surface while entangled. While turtles are vulnerable to forced submergence, some turtles have been recovered alive from sink gillnet gear.

The incidental take of sea turtles in sink gillnets for the spiny dogfish fishery are more common in the mid-Atlantic as compared to the Northeast. From May 1994 to September 2000, a total of 5,068 hauls targeting spiny dogfish were observed from Maine to North Carolina, but only six observed takes occurred. A live Kemp’s ridley was taken off the coast of North Carolina in November 1998. Five additional turtle takes were observed in North Carolina in 2000. In February 2000, a live loggerhead was taken in 16° C water and in March, a live Kemp’s ridley was taken in 13° C water. Also in March of 2000, one dead loggerhead, one live loggerhead, and one dead Kemp’s ridley were taken in the same trip and same haul in 15.6° C water. Most of the 2000 takes in North Carolina occurred in gillnets with soak times of 24 hours, but the haul that took three sea turtles had a soak time of 48 hours.

Other sea turtle takes have occurred in similar sink gillnet fisheries, and while these takes were not by trips targeting spiny dogfish, it does exemplify that sea turtle takes could occur with similar gear and mesh size, and in the same location. In May 1995, a dead loggerhead was taken off Virginia Beach, Virginia, in a 6.5 inch mesh smooth dogfish gillnet trip. In November 1995, a live loggerhead was taken off Ocean City, Maryland, in a 6.5-7.0 inch mesh striped bass trip. In 1999 and 2000, seven sea turtles were taken off the coasts of North Carolina and Virginia in sink gillnets of 5.5 to 6.5 inch mesh; mesh comparable in size to that used in the spiny dogfish fishery. The details of these takes are outlined in Table 3.

Table 3.

Observed Sea Turtle Takes in Mid-Atlantic Sink Gillnet Fisheries Other than Spiny Dogfish with Mesh-Size Comparable to that used in the Spiny Dogfish Fishery

Date	Target Species	Mesh Size	Location	Soak Time (hours)	Water Temperature	Turtle Species	Animal Condition
June 1999	shark unknown	6.0"	Virginia	24	20.5°C	loggerhead	alive
November 1999	southern flounder	6.5"	North Carolina	24	15°C	unknown	unknown
May 2000	smooth dogfish	6.0"	Virginia	24	15.5°C	unknown	alive
October 2000	spanish mackerel	5.0"	North Carolina	1.5	21.1°C	loggerhead	alive

November 2000 (same trip, different hauls)	king mackerel	5.5"	North Carolina	2.5	19.9°C	unknown	unknow n
		5.5"	North Carolina	2.0	19.9°C	unknown	unknow n
November 2000	king mackerel	5.5"	North Carolina	3.1	17.1°C	unknown	alive

Otter trawl effort may also result in the takes of sea turtles. Because otter trawl effort is likely to occur in the lower part of the water column, this gear sector may interact with loggerhead, Kemp's ridley, green, and hawksbill turtles but is unlikely to take leatherback turtles. The capture of turtles in trawls does not always result in mortality; the duration and speed of tows are factors related to the mortality rate.

Incidental takes of sea turtles in otter trawls have been extensively documented. Incidental takes of Kemp's ridleys and loggerheads have been reported in summer flounder trawl operations occurring from Virginia to North Carolina and in the shrimp trawl fishery in the southeastern United States. In the winter of 1991/1992, a total of 2,711 hours of summer flounder trawl fishing were observed. Eighty-three sea turtles were captured including: 50 loggerheads, 29 Kemp's ridleys, two greens, one hawksbill, and one unidentified turtle. Takes were more abundant south of Cape Hatteras and no takes were observed north of Cape Charles, Virginia. Consequently, since 1992, TEDs have been required in the summer flounder fishery south of Cape Charles. The coastal trawl fishery may also be a substantial source of mortality for sea turtles. From 1994 through 1999, with observer coverage of less than one percent, 34 loggerhead sea turtles were observed taken in the coastal trawl fishery. Nine of these were recovered dead. Additionally, one loggerhead take was observed in the long-finned squid bottom trawl fishery during the period of 1995 to 1997.

Little is known about the incidental take of sea turtles in the dogfish otter trawl fishery. From 1989 to approximately 1992, NMFS observers have reported on nearly 8,000 otter trawl hauls from the Gulf of Maine to Long Island (which encompasses a portion of the dogfish fishery areas). The observer effort has been distributed across all months, averaging over 130 hauls per month for four years. No turtles were reported captured on observed trawls within this area. Observer information for otter trawl trips in the northwest Atlantic is also available, but while these takes are thought to have occurred in the mid-Atlantic, the species targeted by these trips are unknown at this time. In 1994, with 2% observer coverage, 21 live loggerheads were taken in the northwest Atlantic otter trawl fishery. In 1995, with 6% observer coverage, 1 live loggerhead was taken and in 1997, with 1% observer coverage, 1 live loggerhead was taken. There were no takes in 1996 with 16% coverage, in 1998 with 1% coverage, or in 1999 with 3% observer coverage.

The best information available is data on observed takes which suggests that fisheries using trawl gear take sea turtles and that some of these interactions are lethal. However, studies suggest that turtles are not likely to be traveling or foraging along the bottom where lethal trawl takes probably occur. In New York waters, time spent on the surface increased with water depth. In water depths greater than 15 meters, young Kemp's ridleys were found to spend the majority of their time in the upper portions of the water column (Morreale and Standora 1990). In southern New England, loggerheads have been observed incidentally taken in offshore drift gillnet and surface longline fisheries, while thousands of hours of observed bottom trawls in similar areas have not yielded any sea turtle takes (NMFS 1992). This is difficult to quantify however, as bottom trawl trips are uncommon during summer and fall months when sea turtle are most likely to occur in deep mid-Atlantic and New England waters. Nevertheless, based on the observed takes in other otter trawl fisheries, it is possible that turtles could also be taken in trawls for dogfish.

Entanglement in bottom longline gear is not well-documented for any fishery in the action area. Of the turtle species, loggerheads would be most likely to interact with this gear sector due to their attraction to baited hooks. Animals may become entangled in the longline or may ingest hooks. However, because longline gear set for dogfish is tended frequently, entanglements may be less likely to occur. Entanglements that do occur may be detected in time to release animals alive.

Interactions between sea turtles and dogfish bottom longline gear, if they do occur, may be more likely when the gear is being retrieved. However, information on this is lacking, and even if it were to occur, we would expect hauling times of bottom longline gear to be less than the actual fishing time of pelagic longline gear. Given these gear differences and other dissimilarities in how these fisheries operate (e.g., use of lightsticks, amount of effort in the fishery, timing of effort), the observer data obtained from the pelagic longline fishery cannot be used to estimate takes of loggerhead or leatherback sea turtles in the dogfish bottom longline fishery.

At present, the short-finned squid fishery may provide the best data on which to base an estimate of turtle takes from bottom longline gear used in the dogfish fishery. Short-finned squid are primarily taken by bottom longline gear in mid to lower mid-Atlantic waters during June through October. Three takes of loggerhead sea turtles were recorded in this fishery from 1995 through 1997. Takes could occur in the bottom longline sector of the dogfish fishery, but due to the lack of observed takes and the seasonal differences in fishing effort between the short-finned squid fishery and the dogfish fishery, incidental captures with this gear are likely to be small.

Incidental takes may occur in the dogfish fishery as the two principal gear types, trawls and gillnets, have taken sea turtles in the past. As fishing effort moves further south, there is a greater potential for interactions with sea turtles. The distribution of dogfish is similar to the migration of turtles, as both are believed to move north in the spring and summer and south in the fall and winter months. This further compounds the potential for interactions. During the fall and winter months, the fishery typically operates from New Jersey to North Carolina. Some sea turtles have been documented in North Carolina all year round (Epperly et al. 1995), but most turtles are present in the mid-Atlantic during the spring, summer and fall. Thus, it appears that the interactions between the dogfish fishery and sea turtles from New Jersey to North Carolina would be the greatest during the fall and potentially the winter in North Carolina. As mentioned previously, incidental takes have occurred in hauls targeting spiny dogfish during February, March and November. During the spring and summer, dogfish are landed mainly in northern waters from New York to Maine. Turtles generally arrive in northeastern waters in June with warmer water temperatures. Thus, the interaction between the dogfish fishery and sea turtles from New York to Maine is greatest during the summer. There is the potential for takes of turtles in the dogfish fishery during periods of overlap.

However, the preferred temperature range for spiny dogfish (7 to 13° C) is lower than the optimal temperature for turtles. This difference does not indicate that interactions will not occur, as turtles have been documented in waters of these temperatures and the March 2000 take of a Kemp's ridley occurred in 13° C water. While turtles are able to sustain temperatures as low as 11°C, turtle distribution (and potential interactions) may be reduced in the preferred temperature range for dogfish. The problem becomes acute when climatic conditions result in concentrations of turtles and dogfish in the same area at the same time. According to the spiny dogfish FMP (1999), these conditions may occur when temperatures are cool in October but then remain moderate into mid-December and result in a concentration of turtles between Oregon Inlet and Cape Hatteras, North Carolina.

Most spiny dogfish are caught at slightly different bottom depths than the areas where sea turtles are most likely to be present. Ruben and Morreale (1999) reported that satellite tracking studies found that juvenile turtles in inshore New York waters mainly occurred in areas where the water depth was between approximately 5 and 15 meters. Additional studies by Morreale (1999) found that satellite tagged juvenile loggerhead turtles left Long Island waters in the fall, and traveled a distance of approximately 1000 km to wintering areas in the south, in waters ranging in depth from 40-60 m. In the spring, most adult and juvenile dogfish were caught in waters with bottom depths between 50 and 150 meters, while in the fall, adult dogfish were primarily caught in waters with bottom depths between 10 and 49 meters and most juvenile dogfish were caught in waters with bottom depths between 25 and 75 meters (Spiny Dogfish FMP, 1999). However, dogfish have been found to spend summers in inshore waters (where turtles are likely to be found foraging) and to overwinter in deeper offshore waters.

B. Effects of Incorporating the ALWTRP into the dogfish fishery

Although the dogfish fishery as managed under the proposed FMP may have a very low potential to interact with rare species of whales such as the right whale, NMFS cannot conclude that interaction will not occur. As discussed in the *Environmental Baseline* section of this Opinion, NMFS has taken certain actions to protect endangered whales under the ALWTRP. These actions are expected to reduce the risk of entanglement in various gear types, including dogfish gillnet gear.

As previously mentioned, it is NMFS' opinion that incorporation of the ALWTRP into the scope of the action is necessary to formulate a biological opinion on the Spiny Dogfish FMP. The ALWTRP measures implemented with the February 16, 1999, final rule modified the gillnet sector of the dogfish gillnet fishery by requiring gear modifications and restricting the use of such gear at certain times of the year in areas where right whales are likely to congregate. Stranding data has shown that entanglement of right whales and other whales in gillnet gear has continued despite these measures. The ALWTRP has, therefore, been revised. The new ALWTRP measures applicable to gillnet fisheries operating east of 72°30'W Longitude, including the dogfish gillnet fishery are:

- knotless weak links at the buoy with a breaking strength of 1,100 lb or less
- weak links placed in the headrope (floatline) at the center of each net panel
- anchoring of net strings that contain 20 net panels or less using one of three anchoring systems, and
- required gear marking midway on the buoy line.

As a result of these revisions, the Gillnet Gear Technology List has been eliminated for all gillnet gear set in the Northeast. The specific gear measures of the interim final rule for gear modifications are described below with a description of how they are designed to reduce the threat of entanglement by large marine organisms.

1. Regulatory Measures

The specific gear measures of the interim final rule for gear modifications are described below with a description of how they are designed to reduce the threat of entanglement by large marine organisms.

Buoy Line Weak Links

The weak link at the buoy is intended to increase the likelihood that a line sliding through a whale's mouth may break away quickly at the buoy before the whale begins to thrash and become more entangled. The breakaway device is expected to reduce risk in cases where a whale encounters the gear and gets line through its mouth or around an appendage at a point close to the buoy.

The required breaking strength in the Interim Final Rule for gear modifications of 1100 lb (498.9 kg) for the anchored gillnet gear buoy line weak links is the same as that specified in the Gillnet Take Reduction Technology List in the final rule. This option on the technology list was developed based on a recommendation from the Gear Advisory Group (GAG) at its June 1997 meeting. The NMFS gear research staff is conducting further investigation for gillnet weak links to see if a lower breaking strength can be used.

The NMFS gear research staff have tested various types of buoy line weak links and provided fishermen with a list of tested devices for use in the proposed action that include swivels, plastic weak links, rope of appropriate diameter, hog rings, and rope stapled to a buoy stick. NMFS gear research team will continue to test any device fishermen claim may work as a weak link and provide fishermen with a determination as to whether the breaking strength is in compliance with current ALWTRP regulations.

Knotless Buoy Line

Buoy line weak links are required by the Interim Final Rule to be knotless when the weak link fails because a weak link that breaks but leaves a knot or other obstruction at the end of the line leading down to the gear would have reduced effectiveness. A knot or piece of a broken link could become lodged in the whale's baleen or around an appendage of a whale or any other large marine organism such as leatherback sea turtles, and prevent the line from slipping through either the baleen or appendage. Observations of right whale jaw anatomy suggest that even a bare line would be difficult to pull through a whale's mouth when the jaw is clamped shut. Testing on baleen obtained from stranded whale carcasses has shown that knots hinder the passage of line through the baleen.

Requiring a knotless buoy line for all gillnet and lobster trap gear set in the federal waters from Rhode Island to Maine may significantly increase the probability that a large whale can survive an encounter with buoy lines rigged in this fashion.

Although the Team initially recommended requiring knot-free buoy lines, it changed to recommending a voluntary measure because fishermen frequently need to repair and re-tie buoy lines at sea. The knot-free buoy line concept is similar to the breakaway buoy concept, where the objective is to keep knots from hanging up in a whale's baleen or around an appendage and preventing the line from sliding out. In addition to the gear modifications, NMFS would recommend the use of splices wherever possible because splices do not increase entanglement threat. However, connecting lines using a splice is not practicable while gear is being hauled, so splicing, if used at all, is usually done on land during seasonal overhaul or as new gear is added. Although concepts for devices to join lines quickly at sea have been proposed, none are yet developed.

Many (approximately 50%) of the fishermen currently use splices in the middle of their buoy and anchor lines to avoid the weakening affect of knots. Encouraging fishermen to use splices wherever possible may reenforce this practice. Reducing knots in the middle of lines appears to be a good practice, but when it comes to possible effects to large whales, the fact that a knot reduces the breaking strength by at least 50% means that knots in the middle of lines may not increase the threat of serious injury from an encounter with these lines.

Gillnet Panel Weak Links And Anchoring System

The Interim Final Rule for gear modifications required weak links in the center of each 50-fathom (300 ft = 91.4 m) net panel floatline (headrope) that are expected to break when a whale exerts pressure in opposition to the resistance provided by the anchoring system and weight of the gear. The weak link allows the floatline to part and unravel from the net mesh when a whale encounters any section of the gear. The net mesh is then freed of the stronger floatline and a large whale has a better chance of breaking free of the weaker monofilament mesh.

The net panel weak link requirement that is contained in the Interim Final rule specifies a breaking strength of no more than 1100 lb (498.8 kg). This breaking strength is a significant reduction from the floatline strength typically used in sink gillnet gear, which ranges from 1700 lb (771.8 kg) to 2500 lb (1135 kg). However, the use of weak links is not expected to hinder retrieval of the gear, as gillnetters would be able to haul their gear by the lead line and the full-strength bridles between net panels.

The anchoring requirement in the gear rules is intended to create sufficient resistance to allow the net panel weak links to break when at least 1100 lb (498.8 kg) of pressure is exerted by a whale on net strings of 20 or fewer net panels. The specified anchoring system is only required for net strings of 20 or fewer nets because NMFS gear research has shown that, for strings of greater than 20 net panels, the 1100 lb (498.8 kg) force necessary to break the weak link is reached solely by the weight and resistance of the gear itself, rendering additional resistance from anchors unnecessary.

In the gear rules, the net panel weak links is required in the center of each net panel floatline, rather than between net panels as was specified for the gillnet technology list option in the final rule. NMFS changed the placement of the net panel weak links because a weak link placed at the bridle may cause a failure at a point in the gear which could compromise the ability to safely haul the gear and could increase chances of lost gear. Furthermore, in cases where a whale hits the gear near a weak link in the floatline, a breaking point within that floatline would maximize the chance for the whale to break away from the net as soon as possible, before becoming entangled in the mesh itself. Once a whale becomes entangled in the mesh itself, there is a greater chance that other parts of the gear including the heavier lines would contribute to the seriousness of the entanglement.

Requiring gillnet panel weak links and anchoring systems for all gillnet gear set in the federal waters from Rhode Island to Maine may significantly increase the probability that a large whale can survive an encounter with gillnets rigged in this fashion.

Gear Marking

Marking gear may help assign entanglements to specific fisheries and areas and therefore inform continued efforts to reduce risks of entanglements through gear modification. Individual identification would provide maximum information on when and where gear was set as well as to provide a description of the modification in use. However, it has proven difficult to find a marking material that can be placed on lines without interfering with fishing operations or creating a safety hazard. Therefore, the team recommended a simplified system involving a one-color marking placed in one location, midway on each buoy line for all northeast anchored gillnet gear. The one-color marking indicates both area and gear type, where previously a two-color code was required. Although this gear marking requirement may shed light on where whales are encountering gear, the resolution is large (Rhode Island to Maine) and can only be used to distinguish the northern waters from southern regions.

Time/Area Closure strategy

Right whales are typically found in high concentrations in the Cape Cod Bay critical habitat from January 1 through May 15 and in the Great South Channel critical habitat from April 1 through June 30. Gillnet gear, including sink gillnet gear regulated by the dogfish FMP, is prohibited during the peak whale use months in the Great South Channel.

The Great South Channel is a major feeding habitat for right whales in spring and early summer. Within a particular season, right whales tend to be concentrated in a single area; although some movement of this aggregation is evident in some years, shifts to the other side of the Great South Channel have not been recorded (Clapham, editor 1999).

The Great South Channel closure to dogfish sink gillnet gear is anticipated to have a beneficial effect on right whales by decreasing gillnet gear in the offshore area frequented by right whales. Typically, offshore gillnet gear entanglements pose a greater risk to protected species since they are less likely to be observed and, when observed, are more difficult to disentangle due to the logistical difficulties of reaching and relocating them. Although there is no way of quantifying the anticipated benefit from reductions in gear, it is generally assumed there may be fewer protected species-gear interactions if there is less gear in the water, especially in critical habitat. Therefore, the overall effect of the Great South Channel closure to dogfish gillnet gear is expected to be of benefit to protected species, particularly right whales who utilize the Great South Channel habitat.

Cape Cod Bay is a winter and spring feeding area for right whales; although they have been observed there year-round. Right whales have been observed in Cape Cod Bay during the summer months in low numbers and with very short residency times, although an exception occurred in 1986 when a concentration of whales became semi-resident in the Bay for several weeks (Hamilton & Mayo 1990). While the timing of their occurrence exhibits some inter-annual variability, in most years peak concentrations occur in February, March and early April (Hamilton & Mayo 1990). This area is of prime importance to right whales from early December through early May. Right whales have been documented as early as December 13, and as late as May 6 in Cape Cod and Massachusetts Bays. Right whales generally appear to enter Cape Cod Bay on the western side and move to the bay's eastern margin, and finally out of the area, over the course of weeks (Hamilton & Mayo 1990). Surface skim feeding by right whales appears to occur with significantly more frequency in Cape Cod Bay than elsewhere in the known range of this population (Mayo & Marx 1990). There may be substantial movement in and out of Cape Cod Bay during the season (Brown & Marx 1999). One right whale was seen in Florida on January 12 before it was sighted in Cape Cod on January 23 and then returned to Florida. Knowledge of medium-scale movements within a habitat area both within CCB and adjacent water (i.e. Great South Channel, Jeffrey's Ledge, Wildcat Knoll) is poor. In addition, it is not known where they go in the winter months. Although the Cape Cod closure to gillnet gear during peak right whale distribution should benefit whales within the critical habitat, the closure may not adequately protect whales that forage out of known concentration areas. In addition, like the Great South Channel closure, effort may be shifted to surrounding areas and lead to increases in gear interactions in those areas.

In summary the ALWTRP regulatory measures require: a reduction of lines in the water, weak links in the center of each 50-fathom gillnet panel floatline (headrope), use of an anchoring system for gillnet strings that contain 20 net panels or less, and knotless weak links at the buoy lines. Overall, these measures are expected to be of benefit to ESA-listed right, humpback and fin whales by reducing the entanglement risk for large cetaceans, reducing the severity of an entanglement should one occur, and by providing a way of better identifying where entanglements occur. All of these measures may also be of benefit to other ESA-listed cetaceans, including sei, sperm, and blue whales. These species typically occur in offshore portions of the affected area. Although entanglements of sei, sperm, and blue whales in gillnet gear are believed to be low, the proposed measures could help an animal avoid serious injury should an entanglement occur.

2. Non-regulatory Measures

Aerial Survey and Disentanglement efforts

Disentangling a whale can reduce the seriousness of an injury or prevent death due to entanglement. Increased awareness and cooperation amongst fishermen, agencies and organizations has already led to successful disentanglements of whales, including right whales. In 2000, three whales were successfully disentangled by the network and contractors including a right whale, humpback whale and a minke whale. Although many of the disentangled whales swam free of gear, apparently in good health, long term effects of entanglement cannot be predicted. However, continued aerial surveys used to sight and identify whales is instrumental in analyzing the long term effects of entanglement.

In addition to the disentanglement team in the Gulf of Maine (headed by the Center for Coastal Studies), disentanglement efforts have been initiated outside New England waters. NMFS will continue to work with the disentanglement network to form local "first response" teams which can respond to entanglements in other areas and of other species prior to (or in some cases in lieu of) dispatching the disentanglement teams. These surveys increase opportunities for sighting entangled whales, respond to unusual events, as well as warn ship operators of the presence of right whales in an area. While it may be difficult to reduce the threat of entanglements to zero, surveys and disentanglement efforts are imperative to insure that if such an event occurs, the whale is released unharmed or with only minor injury that does not inhibit its ability to survive.

Gear Research

The gear research program is investigating new gear modifications through various research sources including NMFS gear staff, contract services and cooperating fishermen. The goal of the gear research is to develop new fishing gear or methods that minimize the risk of entanglements by large whales, either by reducing the chances that a whale will encounter the gear or by reducing the likelihood that gear, when encountered, will entangle the animal. Research has been conducted in the following areas: 1) design, development, testing, and manufacture of inexpensive weak links, 2) remotely operated vehicle observations of the configuration of gillnets and lobster gear, 3) estimation of the tractive (pulling) force of right whales, 4) land testing of gillnet modifications, 5) baleen tests with various line, knots, and splices (to understand how a line gets caught in baleen, and 6) design and fabrication of underwater and dry load cell systems for measuring the hauling and towing loads of fishing gear and the tractive force of animals. The program also undertakes extensive field testing of promising devices and or procedures that are developed from any source. Close coordination with the fixed gear fishermen in the region is a primary goal for the program. Modifying gillnet gear to reduce serious injury or mortalities to large whales is a challenging problem because it is largely unknown how whales get entangled in gear. Gear interactions by whales are rarely observed and very little gear is actually retrieved from observed entangled whales.

C. Summary of Effects of Dogfish Fishery

Based on the information presented in this Opinion, the protected species which may be affected by the dogfish fishery are the right, humpback and fin whale, loggerhead, Kemp's ridley, green and leatherback sea turtle.

1. Whales *(summary of effects)*

The primary gear types used by dogfish vessels are otter trawls and sink gillnets; with sink gillnets the primary gear used. It is expected that interactions of trawl gear with endangered whales may occur but are likely to be rare. The greatest risk to whales from the dogfish fishery is from entanglement in the sink gillnet sector. The dogfish fishery is most likely to interact with right, humpback, and fin whales. Blue sei, and sperm whales do not frequent nearshore waters and are therefore not as likely to encounter dogfish gear. It is often difficult to assess gear found on entangled whales to a specific fishery and documented takes are an underestimation of the total level of interaction between whales and gillnet gear. No gear entanglements have been directly linked to the dogfish fishery, however gillnet gear, like that used in the dogfish fishery has been documented on observed entangled whales.

Effort reduction in the dogfish fishery has been outlined in the FMP. During the rebuilding phase (years two-five) fishing effort directed towards spiny dogfish is predicted to be eliminated. However, some low level of entanglement may still occur in the dogfish fishery as long as some level of fishing effort continues. Risk may also shift to other gillnet fisheries if vessels elect to transfer effort to these other fisheries rather than ceasing operations altogether. There is no information available at this time on the current level of incidental take in the dogfish fishery. The ALWTRP is expected to reduce entanglement risk represented by the gillnet sector of the dogfish fishery. However, because the primary gear used in the dogfish fishery is known to take marine mammals and fishing effort will not be eliminated, risk of entanglement exists.

Baleen whales (right, humpback and fin) are vulnerable to entanglement because they tend to skim and gulp for prey. Younger animals are particularly at risk if the entanglement constricts while they grow. Whales could become entangled in buoy lines of the gillnet or in the net panels.

Right whales. Most right whale mortalities are never observed, therefore the actual annual number of documented mortalities are likely a mere fraction of the actual number of entanglements that occur. During the period of 1995 through 1999, there were at least three documented cases of entanglements of right whales in gillnet gear, including a mortality in 1999 caused by sink gillnet gear. Although the reports did not contain the necessary information to assign the entanglements to a particular fishery, the takes occurred with gillnet gear similar to that used by the dogfish fishery. In 2000, there were eight reports of entangled right whales, but again the reports did not contain the detail necessary to assign the entanglements to a particular fishery or location.

Interactions between right whales and dogfish gear may occur because fishing effort overlaps with right whale distribution. Because dogfish are landed in all months of the year and throughout a broad area of right whale distribution, right whales are likely to encounter fixed gear anywhere. However, the greatest risk of entanglement occurs during the spring and summer when dogfish are targeted in northern waters from New York to Maine, corresponding to the times that right whales are using these areas for feeding/nursing and perhaps mating. Gear interactions may occur in the mid-Atlantic waters when right whales are migrating to calving grounds off the coast of Florida when the mid-Atlantic dogfish fishery effort is highest. Young right whales, particularly females, appear vulnerable to the gillnet sector of the dogfish fishery.

Although the entanglements of right whales in gillnet gear cannot be directly linked to operation of the dogfish gillnet fishery, northern right whales are likely to become entangled in this gear given that right whales occur in areas where dogfish gillnet gear is set. Entanglements of right whales in gillnet gear have continued to occur despite the measures implemented under the initial ALWTRP which were accepted in the 1999 consultation on the Spiny Dogfish FMP as a reasonable and prudent alternative to avoid the likelihood of jeopardy to right whales from the dogfish gillnet fishery. The ALWTRP has been revised with new measures which affect gillnet gear operating in the northeast, however entanglements may still occur in areas unaffected by the Plan. In addition, there is insufficient information to show that the new gear modifications will be successful at preventing mortality of right whales from gillnet gear entanglements that do occur in the northeast.

Assignment of a specific fishery to an observed entanglement is rarely possible because: 1) the whales may be observed miles from the entanglement site, 2) gear cannot be identified to fishery unless retrieved, and 3) in those rare cases where gear is retrieved, identification remains problematic because the same gear (e.g., lines and floats) is used in different fisheries and gear damage may precludes accurate identification to fishery. Additionally, most right whale mortalities are never observed, therefore the actual annual number of mortalities caused by gillnet gear cannot be determined. However, entanglement in gillnet gear like that used in the Spiny Dogfish gillnet fishery has been documented (Waring et al in review), and as such any (e.g., the Spiny Dogfish) gillnet fishery can seriously injure or kill right whales. Thus, we cannot conclude that the fishery does not contribute to mortalities each year.

Caswell *et. al.* (1999) found that right whale survival has declined between 1980 and 1996 based on an analysis of the survival of photo-identified right whales. A population viability model developed by Caswell *et al* (1999) predicts that if these survival rates persist into the future that the population will be extinct in less than 200 years (mean estimate). While the authors did not provide a comprehensive explanation for the decline in the population, a reduction in anthropogenic mortality was cited as the most effective way of improving population performance. Throughout the 1990's it appears that a <u>minimum</u> of 2.4-2.6 human induced right whales mortalities occurred each year, of which more than half were entanglements (Blaylock *et. al.* 1995 Waring *et. al.* 2000).

The documented loss of only one right whale per year, particularly if that whale is a reproductively active female, to Spiny Dogfish gillnet entanglement can reasonably be expected to reduce appreciably the likelihood of both survival and recovery of the population, particularly because of the declining trend and low population size of North Atlantic right whales. While the measures of the ALWTRP will reduce the lethal effects of Spiny Dogfish gillnet fishery on right whales, this fishery still has the potential to seriously injure or kill right whales each year. To ensure the recovery of right whales, mortality and serious injury of right whales by gillnet gear must be eliminated. Spiny Dogfish gillnet entanglements must be reduced to low levels by further separating whales from gillnet gear in areas of high right whale abundance and by implementing gear technology advances. While these measures should reduce persistent entanglements and those that cause serious injuries or mortalities, some nonthreatening entanglements and associated light scarification may still occur.

Humpback whales. It has been reported that gillnets were the primary cause of entanglements and entanglement mortalities of humpbacks in the Gulf of Maine between 1975 and 1990. During the period of 1997 through 2000, NMFS documented at least 42 humpback whale entanglements including eight confirmed cases caused by gillnet gear. Many of the whales were disentangled by the disentanglement network. Determining the cause of most of the entanglements was not possible due to lack of gear retrieved. Of the confirmed humpback entanglements three mortalities were documented, with one determined to be caused by an inshore gillnet gear off North Carolina. The total fishery related mortality and serious injury for this stock is considered to be significant. As with right whales, the greatest entanglement risk occurs during the spring through fall when they use northern waters to feed and where dogfish fishing effort is greatest. Gear interactions can also occur when humpback whales use mid-Atlantic waters as migratory routes to wintering grounds and perhaps feeding. If humpback whales are using mid-Atlantic waters for foraging then the risk of entanglement increases. At this time it is not clear if this is the case. Further studies are needed to determine humpback whale distribution and behavior patterns.

The recent significant number of humpback whale entanglements is a concern that needs further attention. However, given the population size and the steadily increasing size of the population of humpback whales, the interactions between humpback whales and dogfish fishing gear are not expected to result in reductions in reproduction, numbers or distribution of humpback whales, such that the likelihood of survival and recovery is reduced appreciably.

Fin whales. Entanglement of fin whales is rarely documented. However, because they are common in waters of the U.S. Atlantic EEZ, including Stellwagen Bank during the time when dogfish fishery occurs, the potential for entanglement in the fishery exists. Serious injuries or mortalities due to entanglements of fin whales are considered to occur at an insignificant level approaching zero mortality and serious injury rate. Given the best known status of fin whales, the dogfish fishery is not anticipated to reduce the numbers and reproduction of the affected population such that the likelihood of survival and recovery of the species in the long term is reduced appreciably.

Blue whales. There have been no confirmed records of mortality or serious injury to blue whales in the U.S. Atlantic EEZ due to commercial fishing interactions. It is possible that entanglements could occur, however it is unlikely because blue whales rarely occur in east coast U.S. waters. Therefore, the dogfish fishery is not expected to appreciably reduce the likelihood of survival and recovery of the species in the long term.

Sei whales. No reports of fishery-related mortality or serious injury have been documented. Therefore, the dogfish fishery is not expected to appreciably reduce the likelihood of survival and recovery of the species in the long term.

Sperm whales. Three sperm whales entanglements were documented from 1993 through 1998, including fine mesh gillnet and pelagic drift gillnet. Because of their general offshore distribution, sperm whales are unlikely to be impacted by dogfish fishing gear. Therefore, the dogfish fishery is not expected to appreciably reduce the likelihood of survival and recovery of the species in the long term.

2. Sea Turtles

The greatest risk to sea turtles from the dogfish fishery is due to entanglement in fishing gear. Turtles have been observed to be taken in sink gillnets, otter trawls, bottom longline and driftnet gear. The August 13, 1999 spiny dogfish Opinion set an anticipated level of incidental take in the dogfish fishery based upon observed takes from Sea Sampling data for gear types which may be used in the dogfish fishery. The previous level of incidental take was anticipated to be six (6) takes of loggerhead sea turtles (no more than 3 lethal); one (1) lethal or non-lethal take of green sea turtle; one (1) lethal or non-lethal take of leatherback sea turtle; and/or one (1) lethal or non-lethal take of Kemp's ridley sea turtle. Given the recent implementation of the spiny dogfish FMP resulting in a drastic reduction in fishing effort, NMFS does not consider the continuation of the previous level of take to be appropriate.

Sea turtle takes have been documented in spiny dogfish sink gillnets off the coast of North Carolina. Three loggerheads were taken in 2000, 2 of which were from the same haul. Two of these 3 loggerheads were alive. The effort level when these takes occurred was much higher than the levels expected for the next 4 years, but these takes do exemplify that the take of three loggerheads may occur in the fishery in any given year. However, the FMP quota restrictions and reduction in fishing effort are expected to reduce the potential for turtle interactions. Thus, the annual anticipated incidental take level for the entire dogfish fishery is set at 3 loggerheads, 2 of which may be lethal. This take level for loggerheads is also half of what was set in the previous 1999 ITS.

The take levels for green, leatherback, and Kemp's ridley turtles are set at 1 (lethal or non-lethal) to account for some potential level of interaction. This anticipated take was based on the level of observed takes in this fishery (or lack of), the distribution of the fishery and these turtle species, and the decrease in fishing effort associated with the implementation of the FMP. No incidental take of hawksbill sea turtles are expected to occur.

To ensure that the analysis of effects in this biological opinion captures the long-term effects of this recurring activity, NMFS assumes that the fishing activities will occur over the next twenty years, from 2001 to 2021. The impacts to the species and long term anticipated incidental take will be evaluated on this time frame.

Loggerhead sea turtles. Like other sea turtles, loggerheads demonstrate slow growth, delayed maturity, and extended longevity to allow individuals to produce more offspring. A large number of offspring may compensate for the high natural mortality in the early life stages, as mortality rates of eggs and hatchling are generally high and decrease with age and growth. The risks of delayed maturity are that annual survival of the later life stages must be high in order for the population to grow. Population growth has been found to be highly sensitive to changes in annual survival of the juvenile and adult stages. Crouse (1999) reports, "Not only have large juveniles already survived many mortality factors and have a high reproductive value, but there are more large juveniles than adults in the population. Therefore, relatively small changes in the annual survival rate impact a large segment of the population, magnifying the effect."

The loggerhead sea turtles in the action area are likely to represent differing proportions of the four western Atlantic subpopulations. Although the northern breeding population produces about 9 percent of the total loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia. Twenty-five to 59 percent of the loggerhead sea turtles in this area are from the northern nesting population (Sears 1994, Norrgard 1995, Sears et al. 1995, Rankin-Baransky 1997, Bass et al. 1998). The northern subpopulation constitutes an increasing proportion of the mixed stock as turtles migrate northward. As described in the Status of the Species section, the TEWG (2000) estimated that there was a mean of 6,247 northern subpopulation nests in 1989 to 1998, translating into approximately 3,800 nesting females. This subpopulation may be experiencing a significant decline due to a combination of natural and anthropogenic factors, demographic variation, and a loss of genetic viability. It is likely that a large number of the loggerheads which may interact with the dogfish fishery may originate from the northern nesting population. Loggerheads originating from the southern nesting population could also be taken.

NMFS anticipates that less than three loggerheads (no more than two lethal), one green, one leatherback, or one Kemp's ridley will be observed taken each year as a result of the dogfish fishery (all gear types). The death of two loggerheads every year would represent a loss of less than 0.05 percent of the estimated number of nesting females in the northern subpopulation. These are conservative estimates, however, since the loss of loggerhead turtles during these fishing activities are not likely limited to adult females, the only segment of the population, or subpopulation, for which NMFS has any population estimates. Although unlikely to occur, a worst case scenario could occur over the next twenty years if the allowed 40 loggerheads killed were juvenile females from the northern subpopulation. Given the low numbers of anticipated take (even under a worst case scenario) and the current population size, the dogfish fishery is not anticipated to have a detectable effect on the numbers or reproduction of the affected subpopulations that would appreciably reduce the likelihood of survival and recovery of the species.

Kemp's ridley sea turtles. The biology of the Kemp's ridley also suggests that losses of juvenile turtles can have a magnified effect on the survival of this species. The death of one Kemp's ridley every year would also represent a loss of less than 0.03 percent of the population. As with loggerheads, these are conservative estimates since the loss of Kemp's ridleys during fishing activities is not likely limited to adult females, the only segment of the population for which NMFS has any population estimates. Although unlikely to occur, a worse case scenario could occur over the next twenty years if all of the 20 Kemp's ridleys killed were juvenile females. Given the low numbers of anticipated take (even under a worst case scenario) and the estimated population size, the reductions in numbers or reproduction is not expected to appreciably reduce the likelihood of survival and recovery of the species.

Leatherback sea turtles. The leatherback sea turtle population in the Atlantic is estimated to number 15,000 nesting females. Based on model simulations, Spotila et al. (1996) argued that "stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing...Even the Atlantic populations are being exploited at a rate that cannot be sustained." The dogfish fishery is expected to add an additional one take per year which may or may not result in mortality. The death of one leatherback every year would represent an insignificant loss to the population. As with loggerheads, these are conservative estimates since the loss of leatherback sea turtles during these fishing activities are likely not limited to adult females, the only segment of the population for which NMFS has any population estimates. Although unlikely to occur, a worse case scenario could occur over the next twenty years if all of the 20 leatherbacks killed were sub-adult females. While Spotila et al., (1996) stated that Atlantic populations are being exploited at a rate that cannot be sustained, the lethal or nonlethal take of one leatherback a year is not likely to significantly increase total anthropogenic mortalities levels. Even if one lethal take of a nesting female occurred each year in the dogfish fishery, under the worst case scenario, this level of take is not expected to appreciably reduce the likelihood of survival and recovery of leatherback sea turtles.

Green Sea Turtles. Population estimates for the western Atlantic green sea turtles are not available. However, nesting beach data corrected on index beaches since 1989 have shown a general positive trend. At this time, the effects of the incidental take of 1 green sea turtles a year or the population are not known, but this level of lethal or non lethal take is not likely to represent a significant loss to the population. Although, unlikely to occur, a worst case scenario could occur over the next 20 years if all of the 20 green sea turtles killed were juvenile females. Given the low numbers of anticipated take (even under a worst case scenario) and the estimated population size, this loss is not reasonably expected to appreciably reduce the likelihood of survival and recovery of the species.

The proposed action is not expected to appreciably reduce the numbers, distribution or reproduction of protected sea turtles given the information outlined above and due to the changes in the fishery. While takes of turtles could occur in the various gear sectors of the dogfish fishery, the significant reduction in effort due to the recent regulatory changes will beneficially affect turtles by reducing the amount of gear in the water. As effort is drastically reduced, it is unlikely that the dogfish fishery will impact the survival and recovery of sea turtle populations considered in this Opinion.

4. Incorporation of the ALWTRP

Regulatory Measures:
It is anticipated, based on research by the NMFS, that the new gear modifications, including weak links and knotless buoy lines, will increase the probability that a whale will either not become entangled in gear or will be more likely to survive an entanglement should one occur.

As noted above, the new gear modifications of the ALWTRP do not apply to gillnet gear fished in the mid-Atlantic or southeast where northern right whales may also occur. Although a majority of the documented entanglements are sighted in northeast waters, information is lacking on where the entanglements originally occur. Therefore, it cannot be assumed that right whales will not become entangled in gillnet gear that may be fished in areas other than the northeast. In addition, the regulatory portions of the current ALWTRP focus on measures to protect right whales through time/area closures of critical northeast areas where they seasonally concentrate. However, right whales also travel and forage out of known concentration areas and often temporarily congregate in other areas.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Past and present impacts of non-federal actions are part of the environmental baseline. The following discussion will focus on just those actions that may adversely affect listed species.

State Water Fisheries - Commercial fishing activities in state waters are likely to take several protected species. Approximately 80% of the fishery for American lobsters occurs in state waters and many Atlantic states permit coastal gillnetting. However, it is not clear to what extent state-water fisheries may affect listed species differently than the same fisheries operating in federal waters. Further discussion of state water fisheries is contained in the Environmental Baseline section. The Atlantic Coast Cooperative Statistics Program (ACCSP), a cooperative state-federal marine and coastal fisheries data collection program, is expected to provide information on takes of protected species in state fisheries and systematically collect fishing effort data. The data will be useful in monitoring impacts of fisheries on ESA listed species. The Commonwealth of Massachusetts developed a conservation plan for right whales in state waters that addresses state fishery interactions. This is expected to reduce the impacts of fixed gear fisheries on right whales in Massachusetts state waters.

Maritime Industry - Ship strikes have been identified as a significant source of mortality for the North Atlantic right whale population (Kraus 1990) and are known to impact all other endangered whales, specifically humpback, fin and sperm whales. Records from 1970 through 1993 report that eight right whale mortalities in the U.S. were due to ship collisions (Waring et al., 1999). Between 1993 and 1997 the reported mortality and serious injury was six right whales (Waring et al., 1999). Since 1997, one U.S. right whale mortality was attributed to a ship strike. It is important to note that minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so it is more likely to become vulnerable to effects such as entanglements. Ships strike right whales more often than other whales, perhaps because their coastal migration and feeding paths cross heavily traveled shipping lanes more than whale species that travel further out to sea.

Boston, Massachusetts is one of the Atlantic seaboard's busiest ports. In 1999, 1,431 commercial ships used the port of Boston (Container vessels-304, Auto-84, Bulk Cargo-972). The major shipping lane to Boston traverses the Stellwagen Bank National Marine Sanctuary, a major feeding and nursery area for several species of baleen whales. Vessels using the Cape Cod Canal, a major conduit for shipping along the New England Coast must pass through Massachusetts and Cape Cod Bays. In a 1994 survey, 4093 commercial ships (> 20 meters in length) passed through the Cape Cod Canal, with an average of 11 commercial vessels crossing per day (Wiley et al., 1995).

In southeastern waters, shipping channels associated with Jacksonville and Port Everglades, Florida bisect the area that contains the most concentrated whale sightings within right whale critical habitat. These channels and their approaches serve three commercial shipping ports and two military bases. The commercial ports are growing and the port of Jacksonville is undergoing major expansions.

Various initiatives have been planned or undertaken to expand or establish high-speed watercraft service in the northwest Atlantic. The Bar Harbor, ME – Yarmouth, Nova Scotia high-speed ferry conducted its first season of operations in 1998. The ferry makes regular runs during Nova Scotia's busy tourist season, which coincides with peak concentrations of right whale feeding on summering grounds. The 91-meter (300-foot) catamaran travels at speeds up to 90 km/h (48 knots); crossing the Bay of Fundy in less than half the time as traditional car ferries. The operation of this vessel and other high-speed craft such as high-speed whale watching boats may adversely affect threatened and endangered whales and sea turtles in the action area and Canadian waters. NMFS and other member agencies of the Northeast Implementation Team will continue to monitor the development of the high-speed vessel industry and its potential threat to listed species and critical habitat.

Small vessel traffic is also known to take marine mammals and sea turtles. In New England, there are approximately 44 whale watching companies, operating 50-60 boats, with the majority of effort during May through September. The average whale watching boat is 85 feet but size ranges from 50 to 150 feet (NMFS, 1998). In addition, over 500 fishing vessels and over 11,000 pleasure craft frequent Massachusetts and Cape Cod Bays (Wiley et al., 1995). Significant hubs of vessel activity exist to the south as well. These activities have the potential to result in lethal (through entanglement or boat strikes) or non-lethal (through harassment) takes of listed species that could prevent or slow a species recovery. Because most of the whales involved in vessel interaction are juveniles, areas of concentration for young or newborn animals are particularly vulnerable. This also raises concerns that future recruitment to the breeding population may be affected by the focused mortality on one age-class.

Pollution - In feeding areas of the northeast such as the Massachusetts Bay area, the dominant circulation patterns make it probable that pollutant inputs into Massachusetts Bay will affect Cape Cod Bay's right whale critical habitat. Sources of pollutants in the Gulf of Maine and other coastal regions include atmospheric loading of pollutants such as PCB's, storm water runoff from coastal towns, cities and villages, runoff into rivers emptying into bays, groundwater discharges and sewage treatment effluent, and oil spills. A present concern, not yet completely defined, is the possibility of habitat degradation in Massachusetts and Cape Cod Bays due to the Massachusetts Bay Disposal Site (MBDS) located 9.5 miles east of Deer Island. The MBDS began discharging secondary sewage effluent into Massachusetts Bay about 16 miles-from identified right whale critical habitat in 2000.

NMFS concluded in a 1993 biological opinion that the discharge of sewage at the MBDS may affect, but is not likely to jeopardize, the continued existence of any listed or proposed species or critical habitat under NMFS jurisdiction. However, scientific uncertainties remain about the potential unforeseen impacts to the marine ecosystem, the food chain, and endangered species. Therefore, post-discharge monitoring is being conducted by the Massachusetts Water Resources Authority.

Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effect to larger embayments is unknown. Pollutant loads are usually lower in baleen whales than in toothed whales and dolphins. However, a number of organochlorine pesticides were found in the blubber of North Atlantic right whales with PCB's and DDT found in the highest concentrations (Woodley et al., 1991). Contaminants could indirectly degrade habitat if pollution and other factors reduce the food available to marine animals.

Catastrophic events - An increase in commercial vessel traffic/shipping increases the potential for oil/chemical spills. The pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al., 1986). There have been a number of documented oil spills in the northeastern U.S.

Noise Pollution - The potential effects of noise pollution, on marine mammals and sea turtles, range from minor behavioral disturbance to injury and death. The noise level in the ocean is thought to be increasing at a substantial rate due to increases in shipping and other activities, including seismic exploration, offshore drilling and sonar used by military and research vessels. Because under some conditions low frequency sound travels very well through water, few oceans are free of the threat of human noise. While there is no hard evidence of a whale population being adversely impacted by noise, scientists think it is possible that masking, the covering up of one sound by another, could interfere with marine mammals ability to communicate for mating. Masking is a major concern about shipping, but only a few species of marine mammals have been observed to demonstrate behavioral changes to low level sounds. At this time, the only usable threshold used by scientists to predict adverse effects is 180 dB. Although this is not a conclusive fact, researchers believe that 180 dB impulse can trigger the onset of tissue damage for many species of marine mammals. Concerns about noise in the action area of this consultation include increasing noise due to increasing commercial shipping and recreational vessels.

Canadian Waters - The Scotian Shelf off Nova Scotia, Canada has been exposed to heavy commercial shipping, intensive fishing activities and extensive amounts of seismic exploration over the past decades. Right whales congregate in the Bay of Fundy, east and southeast of Grand Manan Island, where the commercial shipping lanes for the port of Saint John, New Brunswick, are charted. Large whale ship strikes and entanglements including right whales have been reported in Canadian waters. Although this area is under the jurisdiction of the Canadian Government, it is close to eastern Maine in the U.S. Entanglements observed in U.S. waters may have originated in Canadian waters, but it is often impossible to determine the origin of the gear.

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

A. Effects on Whales

The dogfish fishery uses a type of gear, primarily sink gillnet, which is known to cause serious injury and mortality to whales. Gear interactions may occur if gear is concentrated in high-use area/times for endangered whales. Spiny dogfish fishing effort is concentrated primarily from New York to Maine in the spring and summer, and from New Jersey to North Carolina in the fall and winter. As the majority of the effort is concentrated in northeastern waters when right, humpback and fin whales are present, risk of gear interactions increases during the spring through early fall for these species. Interactions with whales may occur in the fall and winter, as right and humpback whales can be found transiting in the mid-Atlantic to winter calving grounds off the Florida coast. Blue, sei and sperm whales do not frequent inshore waters and therefore are not as likely to encounter dogfish gear.

While there is the potential for takes in the dogfish fishery, interactions will be drastically reduced with the recent changes to the FMP. The spiny dogfish FMP sets commercial quotas, reducing the fishery to almost bycatch levels, and as a result, the amount of gear in the water is decreased during the rebuilding period. NMFS anticipates that once the spiny dogfish fishery is rebuilt, the fishery will be prosecuted at greatly reduced levels compared to the unregulated fishery prior to FMP implementation. Regardless, any changes to the proposed action will stimulate reinitiation of consultation. Although the FMP may result in a reduction in entanglement risk represented by vessels targeting dogfish, it is not possible to predict whether vessels using gillnet gear will shift to other regulated or unregulated fisheries. Furthermore, as long as gillnets are used to harvest dogfish, there remains a potential for entanglement during dogfish fishery operations.

Right, humpback and fin whales are vulnerable to entanglement in dogfish fishing gear while foraging in areas of concentrated effort. Entanglements of fin whales have been documented but are considered to occur at an insignificant level approaching zero mortality and serious injury rate. While takes of fin whales are possible this level of take is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of fin whales. Humpback whale entanglements in gillnet gear has also been documented. An estimated average of four to six entanglements of humpback whales a year occur in the southern Gulf of Maine. At least 16 possible fishery related interactions occurred in 2000, which is a concern to resource managers. The ALWTRP is anticipated to benefit humpback whales even though the plan is focused on right whales. However, it should be noted that humpback whales do not directly overlap the same foraging areas that right whales frequent and may be overlooked when area/time closures for right whales are implemented. Broadly applied gear modifications, if proven “whale safe” should provide comparable protection to all whales in the area, but further research and testing is needed. Although the total fishery related mortality and serious injury for this stock is considered to be significant, current data strongly suggest that the humpback whale population is steadily increasing despite human-related effects. While takes of humpback whales are possible, this level of take is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of this species.

In view of the northern right whale’s apparent decline and high probability of extinction if the population decline continues, any entanglement that causes serious injury and mortality reduces appreciably the likelihood of survival and recovery of this species. Documented entanglements underestimate the extent of the entanglement problem since all entanglements are unlikely to be observed. Consequently the total level of interaction between fisheries and right whales is unknown. However, recent studies have estimated that over 60% of right whales exhibit scars consistent with fishery interactions. Measures developed under the ALWTRP are not expected to prevent all entanglements of right whales in gillnet gear since these measures are not applicable to all areas where right whale distribution overlaps with operation of the dogfish gillnet fishery. In addition, gear modifications as required by the ALWTRP measures to reduce the number and severity of right whales entanglements in gillnet gear have only recently been implemented. The spiny dogfish gillnet fishery continues to pose a risk of entanglement to northern right whales.

Given the known anthropogenic sources of right whale mortality, their low population size, and their poor reproductive rate, the loss of even one northern right whale, particularly a reproductively active female, as a result of operation of the spiny dogfish gillnet fishery may reduce appreciably the likelihood of both survival and recovery of this species by reducing the number of right whales and their ability to reproduce.

B. Effects on Sea Turtles

Spiny dogfish fishing effort is concentrated primarily from New York to Maine in the spring and summer, and from New Jersey to North Carolina in the fall and winter. Interactions with sea turtles may occur when fishing effort overlaps with sea turtle distribution. This could occur in the summer and fall, as turtles can be found in northeastern waters from June to November.

The dogfish fishery is most likely to affect ESA-listed species through gear interactions as this fishery utilizes gear that may take listed sea turtles, including sink gillnets, otter trawls, bottom longline, and driftnet gear. Observed takes have occurred in sink gillnets targeting spiny dogfish off the coast of North Carolina. From May 1994 to September 2000, a total of 5,068 hauls were observed from Maine to North Carolina but only 6 observed sea turtle takes occurred in 4 hauls. While there have been no documented takes in spiny dogfish otter trawls, bottom longlines, and driftnets, the potential for interaction does exist. However, the level of effort in the dogfish fishery is anticipated to be drastically reduced with the FMP rebuilding schedule, thus reducing the potential level of sea turtle interactions.

Over the next twenty years, loggerhead, leatherback, Kemp's ridley, and green sea turtles will continue to be captured, entangled, or hooked by fisheries other than the dogfish fishery considered in this Opinion. An unknown number of turtles may also be injured or killed from non-fishery related effects such as direct harvest, vessel collisions, dredge entrainment, or ingestion of debris. Adverse effects to sea turtle habitat, including loss of nesting sites or degradation of nesting or foraging areas, are also expected to continue. Since quantitative data on the extent of these impacts to turtle populations are lacking, a reliable cumulative assessment of these effects is not possible.

Based on information provided in the Effects of the Action section of this Opinion, NMFS estimates that continuation of the dogfish fishery, as proposed, will take up to three loggerheads (no more than two lethal), one green, one leatherback, or one Kemp's ridley, annually as a result of the dogfish fishery (all gear types). No incidental take of hawksbill sea turtles is expected to occur in the dogfish fishery. Based on the current status, basic uncertainties in that status, and the anticipated continuation of current levels of injury and mortality described in the environmental baseline and cumulative effects section of this Opinion, and previous takes given the historic observer coverage, this level of take is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the sea turtle populations considered in this opinion by reducing the numbers, distribution, or reproduction of the species.

VIII. CONCLUSION

After reviewing the current status of right whales, the environmental baseline for the action area, the effects of the current spiny dogfish fishery and the cumulative effects, it is the NMFS biological opinion that the spiny dogfish fishery, as currently implemented (including implementation of the most recent ALWTRP measures published December 21, 2000), is likely to jeopardize the continued existence of the right whale. After reviewing the current status of the other listed marine mammals and sea turtles, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the NMFS biological opinion that the spiny dogfish fishery, as currently implemented, is not likely to jeopardize the continued existence of humpback, fin, blue, sei and sperm whales or loggerhead, leatherback, Kemp's ridley, green and hawksbill sea turtles.

Given the current critical status of the right whale population and the aggregate effects of human-caused mortality that has led to the species current status, the right whale population cannot sustain incidental mortality caused by the spiny dogfish fishery as it is currently prosecuted. This opinion is based on knowledge that the dogfish fishery occurs in areas frequented by right whales and uses sink gillnet gear, which is known to cause serious injury and mortality to right whales. Therefore, it is possible that, without restriction, right whales will interact with spiny dogfish gillnet gear in the future.

IX. REASONABLE AND PRUDENT ALTERNATIVE

Regulations (50 CFR§402.02) implementing section 7 of the ESA define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; (3) are economically and technologically feasible; and (4) avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

Since this Opinion has concluded that prosecution of fisheries under the Spiny Dogfish FMP are likely to jeopardize the continued existence of the western North Atlantic right whale, the following reasonable and prudent alternative (RPA) has been identified to avoid the likelihood of jeopardy. The following RPA contains several management measures which, when combined, are designed to avoid the likelihood of jeopardy to right whales. These measures are intended to operate as one alternative, not independently. The fisheries effects that give rise to these determinations include serious injury or mortality that may result from documented entanglements in sink gillnet fishing gear. This RPA also establishes a clear performance goal for reducing entanglements of right whales, a monitoring scheme to inform the management process about the nature of the fishery/right whale interaction while providing a mechanism by which management success can be measured.

NMFS has determined that the ALWTRP measures - published on July 22, 1997, in interim form and in a final rule on February 16, 1999 - identified as an RPA in the 1997 Opinion on the Multispecies FMP were inadequate to avoid jeopardy to right whales. As discussed in this Opinion, NMFS has been prosecuting the Spiny Dogfish fisheries consistent with the ALWTRP, including revisions to those measures effective February 21, 2001, with the assumption that these measures would reduce the number and severity of whale entanglements in Spiny Dogfish gillnet gear. Based on information summarized in this Opinion, NMFS has concluded that these revised measures may not remove the likelihood of jeopardy to right whales given that the measures are new, they are not yet applicable to all areas where right whale distribution overlaps with Spiny Dogfish gillnet gear, and even the loss of one right whale may reduce appreciably the survival and recovery of the species. NMFS, Office of Protected Resources has therefore developed an RPA that will (1) minimize the overlap of right whales and Spiny Dogfish gillnet gear and, (2) expand gear modifications to the Mid-Atlantic and Southeast waters. These measures include: Seasonal and Dynamic Area Management, an expansion of gillnet gear modifications to the Mid-Atlantic and Southeast, continued gear research and modifications, and additional measures that implement and monitor the effectiveness of this RPA. Cumulatively, these measures were developed to eliminate mortalities and serious injuries of right whales in Spiny Dogfish gillnet gear, eliminate serious and prolonged entanglements, and significantly reduce the total number of right whale entanglements in Spiny Dogfish gillnet gear and associated scarification observed on right whales. If a right whale is killed or seriously injured in Spiny Dogfish gillnet gear, gear that is identifiable as being approved for use in Spiny Dogfish fisheries, or gear that cannot be identified as being associated with a specific fishery, this will be considered evidence that the measures outlined in the RPA are not demonstrably effective at reducing right whale injuries or death. Similarly, if a decrease in observed entanglements and scarification is not observed, the performance standards outlined in the RPA will not be considered to have been met.

MANAGEMENT COMPONENTS:

1. Reduce the Potential for Entanglement

A. Seasonal Area Management

Management Action:

- NMFS shall utilize data from aerial surveys illustrating seasonal migrations of right whales to effect annual restrictions to minimize interactions between gillnet fishing gear and right whales. ***Time Frame:*** Review data from 1999, 2000 and 2001 aerial surveys for the ALWTRP meeting in June 2001, and discuss management strategy with the team. Develop Proposed Rule for Seasonal Area Management no later than September 30, 2001. This management strategy shall be implemented by a final rule no later than December 31, 2001, so that it is effective during the 2002 right whale migration season.

Conservation Significance: This measure will immediately upon implementation reduce the potential for interactions between right whales and Spiny Dogfish gear. NMFS anticipates that removing the potential for interactions will result in a reduction in the number of right whale entanglements in Spiny Dogfish fisheries and contribute to the overall elimination of serious injury and mortality associated with use of this gear in areas occupied by right whales.

The most effective method of reducing right whale entanglements is to remove the opportunity for gillnet gear to be present in the same areas and at the same time that right whales are present. Area restrictions can include closing an area to gillnet gear or restricting an area to only modified gear that has been proven to prevent serious injury or mortality to right whales. Since information is not available to identify where past entanglements occurred, or even which fishery the gear may have originated from, it is logical to assume that the highest risk areas are those used seasonally by right whales. NMFS needs to develop a management scheme for the January to June period in the Gulf of Maine (Cape Cod Bay, Great South Channel, and the northern edge of George's Bank) to protect right whales from entanglement during this annual migration. Right whales move from Cape Cod Bay down the Provincetown slope to the Great South Channel and then west to east along the northern edge of Georges Bank from January through June.

B. Dynamic Area Management

Management Action:

- To supplement the Seasonal Area Management program, NMFS shall implement that Dynamic Area Management Program. ***Time Frame:*** Implement immediately in response to concentration of right whales. Identify the framework action and criteria for triggering dynamic area management as a proposed rule by September 30, 2001. This management strategy shall be implemented by a final rule no later than December 31, 2001, in time for the 2002 right whale migration season.

Conservation Significance: This measure will supplement the Seasonal Area Management program by further reducing the number of right whale entanglements in Spiny Dogfish gillnet gear and contributing to the elimination of the serious injury or mortality of right whales caused by this gear.

Right whales typically forage out of known concentration areas and often temporarily congregate in other areas. Although new gear restrictions are effective year-round throughout the Gulf of Maine, NMFS and the Atlantic Large Whale Take Reduction Team believe that a mechanism must be developed to respond to right whale concentrations in areas or times not previously identified as critical.

NMFS has authority under the existing ALWTRP regulations (50 CFR Section 229.32(g)) to open or close areas if right whales have either left early or have remained for a significant period of time. Section 229.32(g)(2) provides authority to take immediate action to open or close areas, change boundaries of closed areas, or address other situations through a notice in the Federal Register. Additional rulemaking will clearly establish the criteria for triggering dynamic area management in order to expedite these actions.

NMFS must be able to respond to observations of concentrations of right whales in areas with fishing gear by requiring prompt removal or modification of that gear to reduce the risk of entanglement to right whales. Although fishermen have voluntarily responded in the past, the gear removal/modification must be mandatory and enforceable.

Existing data on right whale occurrence and distribution were analyzed by Clapham and Pace (2001) to evaluate criteria for triggering temporary area closures. Specific criteria were then applied to existing aerial survey data sets to assess the effectiveness of the closures, as well as the frequency with which closures would have been enacted in past years had triggers been in place. Analyses were based upon the assumption that feeding right whales are at highest risk of entanglement; conversely, it is assumed that transiting whales, while certainly not at zero risk of entrapment, do not constitute sufficient grounds to close an area to fishing. Further information on defining the triggers that will be used for dynamic area management to protect right whales is available in Appendix A.

C. Continue gear research and modifications

Management actions:

- NMFS shall expand the gillnet gear modifications outlined in the Interim Final Rule (December 21, 2000) to include Mid-Atlantic and Southeast waters. ***Time Frame:*** Proposed rule by September 30, 2001; final rule by December 31, 2001.

- Any positive results of analyses of ongoing gear research available for discussion at the ALWTRT meeting in late June 2001, will be implemented through rulemaking.
  Time Frame: Proposed Rule by September 30, 2001; final rule by December 31, 2001.

- NMFS shall host a workshop to investigate options for gillnet specific modifications to prevent serious injury from entangling right whales. ***Time Frame:*** Host workshop by December 31, 2001

- NMFS shall expand research and testing on eliminating floating line in the anchor and buoy lines of gillnet gear and replacing with neutrally buoyant line. ***Time Frame:*** Distribute nets with neutrally buoyant line in the Summer 2001. Evaluate research results and take appropriate management actions no later than September 30, 2002.

- NMFS shall continue research on weak link float lines in gillnet gear to investigate the possibility of reducing the strength of gillnet float-lines, a known problem area in the entanglement of large whales. ***Time Frame:*** Distribute nets with weak link float lines in the Fall 2001 and monitor their effectiveness throughout the GOM and the Great South Channel. Evaluate research results and take appropriate management actions no later than September 30, 2002.

- NMFS shall continue research on Mega-Float line in gillnets to eliminate external plastic floats combined with properly placed weak links. It is thought that there could be a reduction in lethal entanglements if gillnet float lines could be designed to eliminate external plastic floats. ***Time Frame:*** Deploy and evaluate through summer of 2002. Evaluate research results and take appropriate management actions no later than September 2002.

- NMFS shall evaluate field trials of weak link and underwater load cell tests to determine the lowest feasible breaking strengths and most effective placement of weak links, and conduct other tests on recommended gear modifications from the gillnet workshop, contingent upon funding availability. ***Time Frame:*** Evaluations throughout 2001 and into 2002

- NMFS shall implement the most effective placement of weak links and gear marking.
Time Frame: No later than February 28, 2003.

Conservation Significance: Although this measure by itself does not prevent entanglements, these gear modifications will prevent those large whale entanglements that do occur in Spiny Dogfish gillnet gear from persisting and from causing serious injury or mortality. Neutrally buoyant line is an idea originated by the fixed gear industry in the Spring of 2000 as a possible alternative to the use of polypropylene (floating) line in the ground lines of lobster gear. The ALWTRT has identified poly ground-lines as a serious entanglement risk to large whales and has asked that an alternative line be explored. Sink gillnet gear contains floating lines between the net and the anchor lines and sometimes the bottom section of the buoy line. Testing and evaluating the replacement of floating line in gillnet gear with the neutrally buoyant ground line is needed to determine if it is feasible. Designing gillnet gear that would avoid or minimize harmful effects could eliminate one cause of mortality to right whales thus avoiding jeopardy.

The recently implemented Northeast gear modifications need to cover a broader area that right whales use. Right whales transit through mid-Atlantic waters to winter calving grounds off Florida. Since gillnet fishing effort may also occur in the Mid-Atlantic and the Southeast when right whales are present, gillnet gear modifications must be implemented for these areas.

2. Monitoring and Implementation

- NMFS must provide adequate guidance to fishers of their requirement to report incidental takes of marine mammals. NMFS must send a letter to all Spiny Dogfish permit holders detailing the protocol for reporting entangled or stranded whales.
Time Frame: at the beginning of the 2002 fishing year (May 1, 2002)

- NMFS shall monitor and evaluate the effectiveness of the measures prescribed in this reasonable and prudent alternative, specifically Seasonal Area Management, Dynamic Area Management, gear modifications and research, at reducing interactions between right whales and Spiny Dogfish fishing gear that result in right whale injuries or deaths. The occurrence of a right whale killed or seriously injured in (1) gear that is marked as being used in a Spiny Dogfish fishery, (2) gear that is identifiable as being approved for use in a fishery authorized by the Spiny Dogfish FMP, or (3) gear that cannot be identified as being associated with a specific fishery shall constitute evidence that the measures outlined in this reasonable and prudent alternative are not demonstrably effective at reducing right whale injuries or deaths. The estimated number of right whale entanglements in any gear or scarring in 2002 and subsequent years increases or remains the same as the lowest annual level of the three preceding years (2002 would be compared with the lowest level that occurred in 1999, 2000, and 2001), would also constitute evidence that the measures outlined in this reasonable and prudent alternative are not demonstrably effective at reducing right whale injuries or deaths.

- NMFS shall continue to take action that will assist in monitoring the implementation and effectiveness of the RPA which may include, but is not limited to, securing funding for expanded scarification analysis, continuation and expansion of the Disentanglement Network, and the Sighting Advisory System.

- NMFS shall evaluate the 2001 pilot program of Dynamic Area Management including the utility of triggers developed, the comments of the ALWTRT, and the status of state protection plans.

  Time Frame: To supplement the September 2001 Proposed Rule to implement Seasonal Area Management.

Conservation Significance: This measure will ensure that the effectiveness of the RPA is evaluated and that consultation is reinitiated if the RPA does not achieve the established performance standards.

NMFS has determined that the management actions outlined in this reasonable and prudent alternative *collectively* avoid jeopardy. The reasonable and prudent alternative is designed to primarily avoid jeopardy by minimizing the overlap between right whales and gillnet gear through annual area restrictions where seasonal concentrations of right whales are predictable, and the ability to enact restrictions in response to unpredictable concentrations of right whales. In the event that right whales interact with gillnet gear, effects are anticipated to be minimized by developing and implementing gillnet gear that will break away from an entangled whale. This can only be achieved through continued gear research and testing. As new gear technologies are developed, they should be implemented as soon as possible. To minimize the potential for entanglements to cause serious injury or mortality these gear modifications along with aerial/ship surveys and disentanglement efforts are essential. NMFS believes that these management actions collectively provide assurance that there is not an appreciable reduction in the likelihood of survival and recovery of this species.

XI. INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act and federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Incidental take is defined as take that is incidental to, and not the purpose of, the execution of an otherwise lawful activity. Under the terms of Sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

The measures described below are non-discretionary and must therefore be undertaken in order for the exemption in section 7(o)(2) to apply. Failure to implement the terms and conditions through enforceable measures, may result in a lapse of the protective coverage section of 7(o)(2).

When a proposed NMFS action is found to be consistent with section 7(a)(2) of the ESA, section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of incidental taking, if any. If no take is anticipated, the Service must still issue an incidental take statement for the proposed action. It also states that reasonable and prudent measures necessary to minimize impacts of any incidental take be provided along with implementing terms and conditions. Only those takes resulting from the agency action (including those caused by activities approved by the agency) that are identified in this statement and are in compliance with the specified reasonable and prudent alternatives and terms and conditions are exempt from the takings prohibition of Section 9(a), pursuant to section 7(o) of the ESA.

Anticipated Amount or Extent of Incidental Take

NMFS anticipates that the operation of the spiny dogfish fishery under the proposed FMP may result in the injury or mortality of loggerhead, Kemp's ridley, leatherback or green sea turtles. Based on data from observer reports for the Spiny Dogfish fishery as well as other fisheries which use gear similar to that used in the dogfish fishery, and the distribution of dogfish fishing effort in relation to sea turtle abundance, NMFS anticipates that the following numbers of sea turtles may be incidentally taken annually in the Spiny Dogfish fishery.

- three (3) entanglements (no more than 2 lethal) of loggerhead sea turtles;
- one (1) lethal or non-lethal take of green sea turtles;
- one (1) lethal or non-lethal take of leatherback sea turtles; or
- one (1) lethal or non-lethal take of Kemp's ridley sea turtle.

No incidental take of hawksbill sea turtles is expected to occur in the spiny dogfish fishery due to the geographical distribution of this species and the fishery.

NMFS is not including an incidental take authorization for endangered whales at this time because the incidental take of endangered whales currently cannot be authorized under the provisions of section 101(a)(5) of the Marine Mammal Protection Act or its 1994 Amendments. Following issuance of such regulations or authorizations, NMFS may amend this Biological Opinion to include an incidental take allowance for these species, as appropriate.

Anticipated Effects of Take

In the accompanying Opinion, NMFS has determined that this level of anticipated take is not likely to result in jeopardy to the loggerhead, green, leatherback, Kemp's ridley, or hawksbill sea turtle.

Reasonable and Prudent Measures

Sea Turtles - NMFS has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles:

1. NMFS shall provide guidance to spiny dogfish fishers to ensure that any sea turtle incidentally taken is handled with due care, observed for activity, and returned to the water. NMFS must send a letter to all dogfish permit holders detailing the protocol for handling a turtle interaction.

2. NMFS shall notify all dogfish permit holders within 30 days of the beginning of each fishing year of their responsibility to report protected species interactions.

3. NMFS Northeast Fisheries Science Center must evaluate and compile observer information from each gear type used in the spiny dogfish fishery, including the percentage of acceptable observer coverage, and any other relevant information. NMFS will also review vessel trip reports submitted by fishers and with these pieces of information determine whether the incidental take levels provided in this Opinion should be modified or if other management measures need to be implemented to reduce take.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, NMFS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Sea Turtles:

1. NMFS shall monitor impacts to sea turtles by scheduling observer coverage during the months of June through November, when turtles are known to use the area covered by the Spiny Dogfish FMP.

2. NMFS must continue to distribute appropriate sea turtle resuscitation and handling techniques found in 50 CFR part 223.206(d)(1), as follows:

   "Resuscitation must be attempted on sea turtles that are comatose or inactive but not dead by placing the turtle on its breastplate (plastron) and elevating its hindquarters several inches for a period of 1 hour up to 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Sea turtles being resuscitated must be shaded and kept wet or moist. Those that revive and become active must be released over the stern of the boat only when trawls are not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels."

   NMFS must require all vessels permitted for dogfish fisheries post the sea turtle handling guidelines inside the wheelhouse (to ensure that the owner passes it on to the captains and that it can be referred to as needed).

3. NMFS will monitor incidental takes of listed species in the Spiny Dogfish fishery using any combination of observer programs and mandatory reporting and observations (Vessel Trip Reports), if available. The overall monitoring program should be designed to 1) detect any adverse effects resulting from the proposed action, 2) assess the actual level of incidental take in comparison with the anticipated incidental take level documented in the biological opinion, 3) detect when the level of anticipated incidental take is exceeded, and 4) determine the effectiveness of any reasonable and prudent measures and their implementing terms and conditions to minimize the effect of the take on listed species.

4. A report providing sea turtle take estimates based on observed takes in the dogfish fishery must be prepared annually by NMFS Sustainable Fisheries Division. The report must provide species specific take estimates as well as an overall estimate of total sea turtle take. The report must be forwarded to the Chief of Endangered Species, Office of Protected Resources and copied to the NER Assistant Regional Administrator of Protected Resources Division.

5. Incidental takes shall be reported to the NMFS NER Assistant Regional Administrator of Protected Resources Division within 24 hours of returning from the trip in which the incidental take occurred. The reports shall include a description of the animal's condition at the time of release.

6. The NMFS NER Protected Resources Division shall be notified when 75% of the incidental take level for any of the sea turtle species is reached. At this time, the NMFS Sustainable Fisheries Division and Protected Resources Division shall discuss options for reducing additional sea turtle takes.

No more than three (3) loggerhead (no more than two lethal), one (1) green, one (1) leatherback, or one (1) Kemp's ridley sea turtle are anticipated to be incidentally taken in any given year as a result of the dogfish fisheries. No incidental take of hawksbill sea turtles is anticipated. Any sea turtle that is entangled alive and released, injured, or dead is considered to have been incidentally taken. The amount of incidental take of sea turtles in the dogfish fishery may be determined by the number of observed takes, the number of takes calculated to have occurred based on the number of observed takes and the percentage of observer coverage, the number of reported takes (i.e., on the Vessel Trip Reports), the number of turtles found stranded where the cause of the stranding can be attributed to the dogfish fishery, or any combination of the above. The reasonable and prudent measures are designed to minimize the impact of the incidental take that might otherwise result from the proposed action. If, during the dogfish fishery, this level of incidental take is met or exceeded, the additional level of take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures that have been provided. If authorized levels of incidental take are exceeded, the NMFS Northeast Regional Office Sustainable Fisheries Division must immediately request reinitiation of consultation with the Protected Resources Division, and provide an explanation of the causes of the taking.

XII. CONSERVATION RECOMMENDATIONS

In addition to section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, section 7(a)(1) of the ESA places a responsibility on all Federal agencies to "utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species". Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat to help implement recovery plans, or to develop information.

1. In order to better understand sea turtle populations and the impacts of incidental take in dogfish fisheries, NMFS should support (i.e. fund, advocate, promote) in-water abundance estimates of sea turtles to achieve more accurate status assessments for these species and improve our ability to monitor them.

2. Once reasonable in-water estimates are obtained, NMFS should (i.e. fund, advocate, promote) also support population viability analyses or other risk analyses of the sea turtle populations affected by the dogfish fishery. This will help improve the accuracy of future assessments of the effects of different levels of take on sea turtle populations.

3. NMFS should consider incorporating reporting requirements for listed species into the fishery management plans.

4. A significant amount of ghost gear is generated from fixed gear fisheries, occasionally due to conflict with mobile gear fisheries, other vessel traffic, storms, or oceanographic conditions. Mobile gear also occasionally contributes to the quantity of ghost gear. There is potential that this gear could adversely affect both listed species and their habitat. In order to minimize the risks associated with ghost gear, NMFS should assist the USCG in notifying all Atlantic fisheries permit holders of importance of bringing gear back to shore to be discarded properly. In conjunction with the USCG, fishery councils/commissions, and other appropriate parties, NMFS should review current regulations that concern fishing gear or fishing practices that may increase or decrease the amount

of ghost gear to determine where action is necessary to minimize impacts of ghost gear. NMFS should assist the USCG in developing and implementing a program to encourage fishing industry and other marine operators to bring ghost gear in to port for re-use and recycling. In order to maximize effectiveness of gear marking programs, NMFS should work with the USCG and fishery councils/commissions to develop and implement a lost gear reporting system to tie in with ghost gear program and consider incorporating this system into future revisions of the appropriate management plans.

5. NMFS should expand education and outreach and establish a recognition program to promote incentives to assist in prevention activities. Outreach focuses on providing information to fishermen and the public about conditions, causes and solutions to protecting endangered species and continuing commercial fishing. Outreach is an essential element for building ongoing stewardship for endangered species. Involvement engages people to solicit their ideas and comments to help direct conservation ideas and participate meaningfully in decision-making processes. Examples of assistance by fishermen occur but often go unnoticed. Recognizing the positive efforts of individuals, fishing organizations and others encourages stewardship activities and practices and sharing good ideas. Parties that demonstrate innovation and leadership in resource protection should be recognized and used as models for others.

6. As ‘whale safe’ gear is developed NMFS should continue to cooperate with the Canadian Government to compare research findings and facilitate implementation in both countries of the most promising technology. In addressing the threat to right whales in gear entanglements, measures that focus only on incidental takes reductions in the U.S. are likely to be insufficient. To achieve comprehensive right whale take reductions in the north Atlantic fisheries, measures must be found that can be implemented by all fishing fleets in the entire Gulf of Maine Watershed. Fishing tactics and modified gear configurations - technical solutions - that allow lobster and gillnet vessels from all fleets to continue to catch target species effectively are likely to be effective solutions, regardless if the gear is set in U.S. or Canadian waters. Continued cooperation between the U.S. and Canada is also encouraged on disentanglement efforts.

7. NMFS should evaluate the effectiveness of the ALWTRP on other large whales that may be affected by fishing gear. The ALWTRP focuses largely on right whales but it has been assumed that other large whales will benefit from measures such as gear modifications. In light of the significant number of humpback whale entanglements, every effort should be made to determine what additional measures are needed to protect humpbacks from serious injury or mortality.

8. NMFS should monitor fishing effort trends (spatial and temporal) to provide consistent oversight of fishing effort trends as they relate to protected species. The data should be provided to resource managers in a GIS format to be used to evaluate the spatial and temporal overlap of fishing effort and right whale concentrations. NMFS should have focused evaluations of the potential effects of amendments/adjustments to the FMP in terms of shifting effort to different areas or into different fisheries.

9. NMFS should review the report from the ship strike workshop (April 11-12, 2001) including recommendations for future actions. NMFS should consider the following management options proposed by the ship strike committee of the Northeast right whale implementation team:

   - Routing vessels around areas where there is a high risk of collision between right whales and ships.
   - Restricting vessel speed through areas where there is a high risk of collision between right whales and ships.
   - Measures such as dedicated visual observers or active sonar systems that might enable vessels to detect and avoid right whales.
   - Measures such as acoustic and or visual alarms that might encourage right whales to avoid ships.

10. NMFS shall consider expanding existing critical habitats to accurately reflect what is known about areas used by right whales, including historic distribution.

11. Recent survey data, in conjunction with historic right whale sighting data, suggest that all three existing Critical Habitat areas may need to be revised to accurately reflect what is known about areas used by right whales. New data collected and analyzed by the NEFSC from aerial survey efforts has verified largely opportunistic data from historic sightings regarding the connection between the CCB area, the GSC area and the northern edge of Georges Bank. The implication is that, rather than being separate right whale habitat, they are one connected habitat that flows from west to east during the high use period from January through June. NMFS should consider expansion of critical habitat if it is determined that these areas require special management considerations or protection.

12. NMFS should develop a strategic plan to address bycatch of listed marine mammals on a gear basis, similar to the plan currently under development for sea turtles. Since the sea turtle plan is focused on reducing entanglements in Atlantic fisheries, these efforts should be closely coordinated.

XIII. REINITIATION OF CONSULTATION

This concludes formal consultation on the federal dogfish fishery as managed under the proposed Spiny Dogfish FMP. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) a new species is listed or critical habitat designated that may be affected by the action; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered. In instances where the amount or extent of incidental take is exceeded, NMFS' Office of Sustainable Fisheries must immediately reinitiate formal consultation.

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